

JRC SCIENTIFIC AND POLICY REPORTS

ERAWATCH COUNTRY REPORTS 2011: The Netherlands

Jasper Deuten

2013



Report EUR 25712 EN

European Commission
Joint Research Centre
Institute for Prospective Technological Studies

Contact information

Address: Edificio Expo. c/ Inca Garcilaso, 3. E-41092 Seville (Spain)
E-mail: jrc-ipts-secretariat@ec.europa.eu
Tel.: +34 954488318
Fax: +34 954488300

<http://ipts.jrc.ec.europa.eu>
<http://www.jrc.ec.europa.eu>

Legal Notice

Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this publication.

Europe Direct is a service to help you find answers to your questions about the European Union
Freephone number (*): 00 800 6 7 8 9 10 11
(*) Certain mobile telephone operators do not allow access to 00 800 numbers or these calls may be billed.

A great deal of additional information on the European Union is available on the Internet.
It can be accessed through the Europa server <http://europa.eu/>.

JRC77773

EUR 25712 EN

ISBN 978-92-79-28111-2 (pdf)

ISSN 1831-9424 (online)

doi:10.2791/51693

Luxembourg: Publications Office of the European Union, 2013

© European Union, 2013

Reproduction is authorised provided the source is acknowledged.

Printed in Spain

Acknowledgements and further information:

This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). [ERAWATCH](#) is a joint initiative of the European Commission's [Directorate General for Research and Innovation](#) and [Joint Research Centre](#).

The analytical framework and the structure of the reports have been developed by the [Institute for Prospective Technological Studies of the Joint Research Centre \(JRC-IPTS\)](#) and [Directorate General for Research and Innovation](#) with contributions from [ERAWATCH Network](#) Asbl. The report has been produced by the [ERAWATCH Network](#) under contract to JRC-IPTS. The first draft of this report was produced in November 2011 and is focused on developments taking place in the previous twelve months. In particular, it has benefited from comments and suggestions of Terttu Luukkonen, who reviewed the draft report. The contributions and comments of Andries Bradsma from JRC-IPTS and DG-RTD are also gratefully acknowledged.

The report is currently only published in electronic format and available on the [ERAWATCH website](#). Comments on this report are welcome and should be addressed to jrc-ipts-erawatch-helpdesk@ec.europa.eu.

Copyright of this document belongs to the European Commission. Neither the European Commission, nor any person acting on its behalf, may be held responsible for the use of the information contained in this document, or for any errors which, despite careful preparation and checking, may appear.

Executive Summary

The Netherlands is, in economic terms, among the better performing countries in the world. The GDP per inhabitant is well above EU27 average. Due to the economic crisis, GDP growth varied: while growth was still high (3.9%) in 2007, it dropped to 1.8% in 2008 and then further deteriorated to -3.5% in 2009. In 2010 there was a recovery with 1.7% and for 2011 1.9% growth is expected.¹ According to the Innovation Union Scoreboard 2010, the Netherlands is in the group 'innovation followers'. Within this group, it is a 'moderate grower'. In terms of GERD as % of GDP the Netherlands performs below EU27 average (GERD=1.83% in 2010). The GERD has increased slightly in 2008-2010 as % of GDP – mainly thanks to a sharp drop in GDP growth –, but remains well below EU average. In terms of euro per capita the GERD has decreased in 2009, but increased in 2010 above the level of 2008. The GBAORD is well above EU average and has increased during 2008-2010, both in terms of million euro and as % of GDP² (GBAORD=0.91% in 2010). The BERD is relatively low with 0.87% of GDP (2010). In real terms, there was a small decline in R&D expenditure by the private sector, which can largely be attributed to the financial/economic crisis.

The international position of the Dutch HE sector is good with relatively high publication output and high impact-scores. Researchers in the Netherlands are one of the most productive in the world. The share of R&D personnel and researchers in the labour force is, however, relatively low.

The business sector structure of the Netherlands is characterised by a number of strong sectors, i.e. the community services, business activities and the ICT sectors, electronic equipment and office machinery industries, the chemicals and the food industry and mining (natural gas & oil) and agriculture.³ A large part of R&D by Dutch businesses is performed by a limited number of large multinationals.

The main actors and institutions in research and innovation governance system are the Ministry of Education, Culture and Science ([OCW](#)) and the Ministry of Economic Affairs, Agriculture and Innovation ([EL&I](#)). EL&I is the result of a merger in October 2010 of the Ministry of Economic Affairs (EZ) and the Ministry of Agriculture, Nature and Food Quality (LNV). This new ministry plays a stronger role in central governance of national innovation policy. The main bodies that are responsible for managing and implementing policies are [NWO](#), the research council for technical sciences [STW](#) (an independent part of NWO), [KNAW](#), and [NL Agency](#) (an agency of EL&I).

¹ Eurostat, data extracted on 7 November 2011.

² The sharp increase in 2009 can largely be contributed to the introduction of a new calculation method.

³ ERAWATCH (2006) Country Specialisation Report: The Netherlands, June 2006.

Community services include: L–Public administration and defence; compulsory social security; M–Education; N–Health and social work; O–Other community, social and personal service activities; P–Private households with employed persons; Q–Extra-territorial organisations and bodies (ISIC v3 codes 75-99).

In terms of share of GDP, the Netherlands has a small Industry sector (with Food and Chemicals as exceptions), a large Services sector, a large Mining and quarrying sector and a large Agriculture sector in comparison with EU15 (Parliamentary document 21501-20, nr. 533, "Factsheet over de invloed van de sectorstructuur op de private R&D-positie van Nederland", 23 May 2011).

The Dutch national innovation system faces two main structural challenges: the lack of innovativeness of the business sector and the (future) supply of human capital, especially in science & engineering.

The R&D intensity and innovativeness of the private sector is relatively low. There are various indicators that point at this: BERD is relatively low and further declining. The low BERD is reflected in the relatively low share of researchers in the Dutch labour force. Non-R&D innovation expenditures are also relatively low, but these show a strong growth. The Netherlands performs below EU average in terms of SMEs introducing product or process innovations, SMEs introducing marketing or organisational innovations, Sales of new-to-market and new-to-firm innovations, Medium and high-tech manufacturing exports, Knowledge-intensive services exports and Collaboration between SMEs and knowledge institutes.⁴ Entrepreneurship in the Netherlands is, however, becoming stronger especially in terms of higher entrepreneurial intentions, a higher early-stage entrepreneurial activity and a higher rate of informal investment. Remaining weaknesses include the rates of product innovation and business innovation among early-stage entrepreneurs the number of fast-growing enterprises.⁵

- A second structural challenge is in human capital. Too many HE students drop out too early, talented students are not sufficiently stimulated and challenged in their education, and the HE system is too inflexible to respond adequately to the varied demands from students and the labour market. The quality of higher education is good in general, but there is too little room for excellence. More differentiation is needed in the structure of the system, in the profiles of the higher education institutes and in the courses that are offered. Furthermore, life-long learning is not well developed in the Netherlands. The number of graduates in science & engineering is well below EU average. The share of R&D personnel and researchers in the labour force is relatively low and gradually decreasing.
- In October 2010 a new centre-right wing cabinet (a minority coalition of the pro-business liberal party–VVD and the Christian Democrats–CDA) came into office. Its R&I strategy is incorporated in EL&I's 'To the top: Towards a new enterprise policy' (Feb 2011), followed by 'To the top: Enterprise policy in action(s)' (Sept 2011); and OCW's 'Quality in diversity: Strategic Agenda Higher Education, Research and Science' (July 2011).

Key elements in EL&I's R&I strategy are: (i) less subsidies in exchange for lower (corporate) taxes and tax incentives; (ii) less and simpler rules; (iii) broader access to corporate finance (credit facilities); (iv) better utilisation of the public knowledge infrastructure by businesses – especially in the 'top sectors'; and (v) better alignment of fiscal policy, education policy, foreign policy and diplomacy with the needs of businesses – especially in the 'top sectors'. The formal longer-term policy ambition is: (1) The Netherlands in the top 5 of knowledge economies in the world (in 2020); (2) Increase of Dutch R&D-expenditures to 2.5% of GDP (in 2020); (3) Creation of Top consortia for Knowledge and Innovation (TKIs) in which public and private parties participate for more than €500m, of which at least 40% is funded by the business sector (in 2015).

⁴ See Innovation Union Scoreboard 2010.

⁵ EIM (2011) Global Entrepreneurship Monitor 2010 The Netherlands. The emergence of an entrepreneurial society

The national R&I strategy includes a ‘top sector’ approach. Nine such ‘top sectors’ have been identified,⁶ which are characterised by strong market and export positions, a good knowledge base, public-private collaborations and a potential to contribute to innovative solutions for societal challenges.⁷ In an interactive policy process, the government, the business sector and knowledge institutes in the top sectors will jointly identify the problems and opportunities for each sector and developed policy agendas which combine all relevant policy domains (e.g. education policy, research policy, foreign policy, environment policy ...). For each top sector a ‘top team’ of entrepreneurs and researchers has been formed. These have been asked by the cabinet to make concrete proposals for these policy agendas.

New elements in Dutch R&I policy include: €500m worth of innovation subsidies for businesses are abolished and replaced by generic tax incentives and loans; EL&I gets a stronger coordinative role in R&I policy; NWO, KNAW and PROs are expected to participate in the top sectors with a substantial part of their budgets; development of integral policy agendas for the top sectors, with businesses in the lead; the FES fund, which is fed with revenues from natural gas exploitation, is no longer used for investments in R&I.

Since the top sectors are manifest in regional clusters, regional governments are expected to play an important role in the top sector approach and contribute with additional funding.⁸ In 2012 agreements will be made between national and regional governments on subjects such as attracting foreign companies/investments/talents, trade missions, innovation contracts and human capital.

In addition, 2.5% of the procurement budget of the government will be used for innovation-oriented procurement (including SBIR) with projects in the top sectors. In OCW’s Strategic Agenda four main lines of action are identified: (1) a more stringent and ambitious study climate; (2) stronger distinguishing profiles and more differentiation in education; (3) stronger (public-private) collaboration in the triangle education-research-entrepreneurship; and (4) stronger distinguishing profiles and specialisation of knowledge institutes.⁹ A new element is that performance agreements will be made between OCW and HEIs to make them accountable for the achievements in these four areas. The performance agreements should result in a reduction of the number of study programmes, study programmes that are more relevant for the labour market, more focus and critical mass in research and more impacts of research. Other concrete policy measures include: a reallocation of budgets for a ‘quality impulse’ in higher education; changes in the allocation system for HE funding, with a large component for ‘quality and profile’; and new laws and regulations to effectuate new policy measures for ensuring/guaranteeing the quality of diplomas, study success, teaching quality and intensity, selection of students, differentiation in supply of study

⁶ Agro-food; Horticulture and propagating stock; High-tech materials and systems; Energy; Logistics; Creative industry; Life sciences; Chemicals; and Water

⁷ The ‘top sectors’ largely overlap with the ‘key areas’ from the previous cabinet period. In the period 2007-2010 subsidies for innovation programmes in key areas were a major instrument in the innovation policy mix.

⁸ Financial contributions of the provinces: Gelderland (€100m), Limburg (€55m), Overijssel (€250m) and Zuid-Holland (€40m). The policy agendas of South-East Netherlands (Brainport 2020) and the North-wing of the Randstad are also aligned with the top sector approach.

⁹ Profiles relate to specialisation and differentiation of universities vis-à-vis other universities in terms of research and/or education. Currently, universities are rather similar and do not have a distinguishing profile. The Strategy Agenda argues for more differentiation and specialisation between universities.

programmes and funding of HEIs. To support the top sector approach, the valorisation task of HEIs is better anchored (in the mission).

The national R&I priorities are consistent with structural challenges in the Dutch R&I system. Much of the policy measures are aimed at increasing the R&D-intensity of the Dutch business sector, especially via the top sector approach. The challenges in human capital are also addressed in EL&I's top sector approach and in OCW's Strategic Agenda. The "[Policy Mix Project](#)" identified the following six 'routes' to stimulate R&D investment:¹⁰

1. Promoting the establishment of new indigenous R&D performing firms;
2. Stimulating greater R&D investment in R&D performing firms;
3. Stimulating firms that do not perform R&D yet to perform R&D;
4. Attracting R&D-performing firms from abroad;
5. Increasing extramural R&D carried out in cooperation with the public sector or other firms;
6. Increasing R&D in the public sector.

Route 1 is not one of the dominant routes in the Dutch policy mix in terms of budgetary weight. Route 2 was and is a very important route in the Dutch policy mix. It includes several of the largest policy measures, including the fiscal incentives [R&D tax credit \(WBSO\)](#) and the new [R&D Allowance \(RDA\)](#). Route 3 is mainly taken indirectly via measures that subsume under route 2. Route 4 becomes increasingly important, but it is mainly addressed indirectly via a good 'climate' for business and research & innovation and via other routes (especially 2, 5 and 6). In the new top sector approach, foreign policy will be used to create a stronger 'brand' of the Netherlands as an attractive location for talented knowledge workers, R&D investments and R&D-performing businesses. Route 5 no longer benefits from programme-based subsidies and investments from the FES fund. Both are being phased out. In the top sector approach, companies are invited to participate in TKIs and a fiscal scheme (RDA+) will be introduced to give a tax incentive to companies to participate in the TKIs. Route 6 will remain important in terms of size of public research funding. In the top sector approach, a substantial share of the R&D funding via NWO, KNAW and the PROs will, however, become part of the innovation contracts of the top sectors (cf. route 5).

With regard to the alignment of the national policy mix with the ERA objectives, the following summarising conclusions are made:

1. Labour Market for Researchers: The share of R&D personnel and researchers in the Dutch labour force is relatively low, and declining. Especially in science & engineering the situation is not good. In addition, entrepreneurship amongst students and (young) researchers could be improved. Recent changes in policy that address these challenges are: (i) More variation in researchers' training and allowing universities to introduce bursary PhD students; (ii) Action plans in the top sector approach to increase the number of students in science & engineering (at all levels); and (iii) More attention for entrepreneurship in education and alignment of education and training with business needs (in top sectors).

¹⁰ The routes cover the major ways of increasing public and private R&D expenditures in a country. Each route is associated with a different target group, though there are overlaps across routes. The routes are not mutually exclusive as, for example, competitiveness poles of cluster strategies aim to act on several routes at a time. Within one 'route', the policy portfolio varies from country to country and region to region depending to policy traditions, specific needs of the system etc.

2. *Cross-border cooperation*: A main challenge would be to further explore and exploit opportunities for cross-border cooperation. However, there have not been recent policy changes.
3. *World class research infrastructures*: A main challenge is that there is no structural budget for large-scale research infrastructures. A recent policy change is that there will be investments in large-scale research facilities as part of reallocation of budgets to stimulate universities to create more distinguishing profiles. In addition, the national roadmap for large-scale research facilities will be updated.
4. *Research institutions*: A main challenge is to create more distinguishing profiles in education and research for universities: In OCW's Strategic Agenda, changes in the allocation system for HE funding are announced, with more attention for 'quality' (rather than quantity) and creation of a distinguishing profile. In addition, performance agreements between universities and the government are introduced.
5. *Public-private partnerships*: A main shift in national policy is the discontinuation of subsidies (e.g. from the FES fund) for PPPs in R&D. The new top sector approach put firms in the lead of developing public-private 'innovation contracts'. Firms are expected to contribute 40% of the budget. In addition, national policy has emphasised valorisation as a formal third mission of HEIs.
6. *Knowledge circulation across Europe*: National policy puts emphasis on national knowledge circulation and R&D cooperation rather than cross-border circulation and cooperation. Policy is structured according to national top sectors rather than European challenges. The top sectors are expected to take the lead in developing cross-border collaborations – if this helps to improve the competitiveness of the top sector.
7. *International Cooperation*: The latest internationalisation agenda (national strategy for international cooperation) is from 2008 and there have not been main recent policy changes.

TABLE OF CONTENTS

1	Introduction.....	9
2	Structural challenges faced by the national system.....	13
3	Assessment of the national innovation strategy	15
3.1	National research and innovation priorities	15
3.2	Trends in R&D funding.....	22
3.3	Evolution and analysis of the policy mixes	24
3.4	Assessment of the policy mix.....	25
4	National policy and the European perspective	27
	Annex: Alignment of national policies with ERA pillars / objectives	29
	References	45
	List of Abbreviations	46

1 Introduction

The Netherlands is a prosperous, densely populated country with 16.7 million inhabitants in 2011, which amounts to 3.3% of the total EU27 population.¹¹ The Dutch knowledge economy is, in economic terms, among the better performing countries in the world. The share of the Netherlands in the total GDP of the EU27 is relatively high with 4.4% (2010).¹² The GDP per inhabitant is well above EU27 average. In the period 2008–2010 it first dropped from €36,200 per inhabitant to €34,600 and then grew to €35,400 per inhabitant. Due to the economic crisis, GDP growth varied: while growth was still high (3.9%) in 2007, it dropped to 1.8% in 2008 and then further deteriorated to –3.5% in 2009. In 2010 there was a recovery with 1.7% and for 2011 1.9% growth is expected.¹³ The share of the Netherlands in the total R&D expenditures (GERD) of the EU27 is also relatively high with 4.4% (2010). In terms of GERD as % of GDP, however, the Netherlands performs below EU27 average. BERD in particular is relatively low. (GERD=1.83% and BERD=0.87% in 2010). GBAORD (% of GDP), on the other hand, is well above EU27 average. (GBOARD=0.91% in 2010). In section 3.2 more details on R&D statistics are given. Table 1 gives an overview of the R&D funding streams in 2009. The Business sector is the largest source of R&D funds (44%), followed by the Government (40%). Almost 11% of the total R&D expenditures is funded from abroad. Most of the foreign funds go to the business sector. The HE sector receives almost 80% of its R&D funding from the government. The PROs receive more than half of their R&D funds from the government and almost one-third from the Business sector.

Table 1 R&D funding streams in 2009 (in € billion and %)

Destination Source	Higher education	Research institutes	Business sector	Total
Government	3.3 (78.6%)	0.7 (53.8%)	0.2 (4.1%)	4.2 (40.4%)
Business	0.3 (7.1%)	0.4 (30.8%)	3.9 (79.6%)	4.6 (44.2%)
Private non-profit	0.4 (9.5%)	0.1 (7.7%)	0.0 (0.0%)	0.5 (4.8%)
Abroad	0.2 (4.8%)	0.1 (7.7%)	0.8 (16.3%)	1.1 (10.6%)
Total	4.2 (100%)	1.3 (100%)	4.9 (100%)	10.4 (100%)

Source: OCW (2011) Kerncijfers 2006-2010.

According to the Innovation Union Scoreboard 2010, the Netherlands is in the group ‘innovation followers’, with innovation performance below those of the ‘Innovation leaders’ but close to or above that of the EU27 average.¹⁴ Within this group, the Netherlands is a ‘moderate grower’ – which is an improvement vis-à-vis the previous Innovation Scoreboard (2009), when the Netherlands was characterised as a ‘slow grower’. According to the IU Scoreboard 2010, the Netherlands has relative strengths in

¹¹ Eurostat

¹² Eurostat, GDP at market prices; Millions of Purchasing Power Standard, GDP of NL (2010) is €541.4b. GDP of EU27 (2010) is €12,257.5b.

¹³ Eurostat, data extracted on 7 November 2011.

¹⁴ Other ‘innovation followers’ are Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg and Slovenia and the UK. ([Innovation Union Scoreboard 2010](#))

‘Open, excellent and attractive research systems’, ‘Finance and support’ and ‘Intellectual assets’. Relative weaknesses are in ‘Firm investments’ and ‘Innovators’.¹⁵

The international position of the Dutch HE sector is good.¹⁶ Dutch scientists have relatively high publication output (especially in Nature and Health) and have relatively high impact-scores. Although the number of researchers in the Netherlands is relatively low, the Netherlands produces almost 2.5% of all scientific knowledge in international journals, which is much more than its share in the world population (0.2%). Researchers in the Netherlands are one of the most productive in the world. Also in terms of publications per million euro R&D expenditures the Netherlands scores very well. The citation impact for the Netherlands is high (the field normalised impact is 1.40 for 2006–2009). The impact scores are particularly high in Nature, Health and Agriculture. The Netherlands also has good scores in terms of patents.¹⁷ While the output of the Dutch research system in terms of publications and patents is quite good, the input shows a declining trend. The share of R&D personnel in the labour force is relatively low.

The business sector structure of the Netherlands is characterised by a number of strong sectors, i.e. the community services, business activities and the ICT sectors, electronic equipment and office machinery industries, the chemicals and the food industry and mining (natural gas & oil) and agriculture.¹⁸ There are correlations between economic, technological and BERD specialisations in the Netherlands. Compared to EU15 average, sectors that have relatively high BERD include mining, electronic equipment and office machinery, trade, food, agriculture, construction, chemicals, ships, and basic metals.¹⁹ A large part of R&D by Dutch businesses is performed by a limited number of large multinationals.²⁰ Together they amount for more than half of all business expenditures on R&D. These companies have good absorptive capacities and are well-connected with the public knowledge infrastructure.

The structure of the national research and innovation system and its governance is presented in the figure below.

¹⁵ In addition, high growth is observed for ‘Non-R&D innovation expenditure’, ‘PCT patent applications in societal challenges’ and ‘Community trademarks’. Growth performance in ‘Human resources’, ‘Open, excellent and attractive research systems’ and ‘Intellectual assets’ is above average. In the other dimensions it is below average. (IU Scoreboard 2010).

¹⁶ Source of the data in this paragraph: Dialogic and NIFU STEP (2011) Wetenschaps- en Technologie-indicatoren.

¹⁷ This is largely due to Philips. All Philips patents are applied by the Dutch head office, but approximately half of the R&D that led to the patents was performed in the Netherlands.

¹⁸ ERAWATCH (2006) Country Specialisation Report: The Netherlands, June 2006.

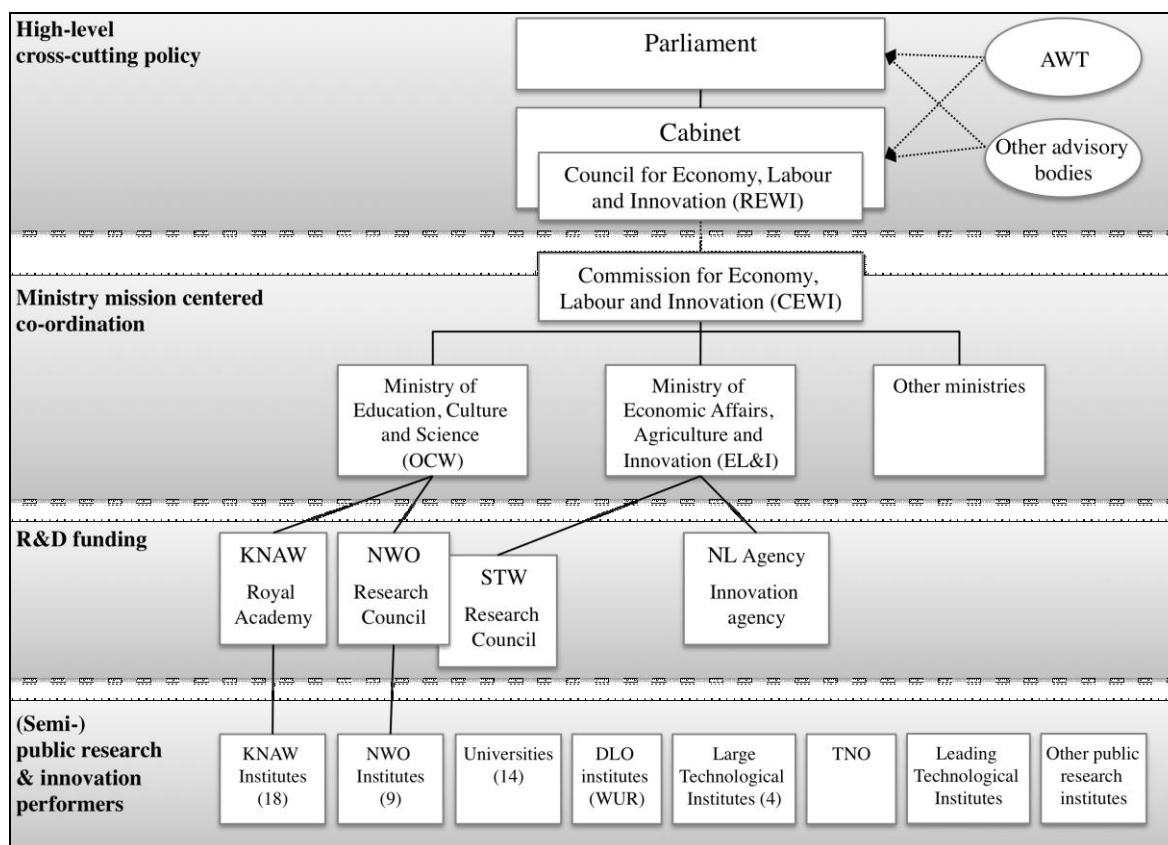
Community services include: L–Public administration and defence; compulsory social security; M–Education; N–Health and social work; O–Other community, social and personal service activities; P–Private households with employed persons; Q–Extra-territorial organisations and bodies (ISIC v3 codes 75-99).

In terms of share of GDP, the Netherlands has a small Industry sector (with Food and Chemicals as exceptions), a large Services sector, a large Mining and quarrying sector and a large Agriculture sector in comparison with EU15 (Parliamentary document 21501-20, nr. 533, “Factsheet over de invloed van de sectorstructuur op de private R&D-positie van Nederland”, 23 May 2011).

¹⁹ ERAWATCH (2006) Country Specialisation Report: The Netherlands, June 2006.

²⁰ Philips (electronics), ASML (integrated circuits equipment), Shell (oil&gas), DSM (nutritional and pharma ingredients, performance materials and industrial chemicals), NXP (semiconductors), Unilever (food, personal care), Océ (copiers), KPN/Getronics (ICT services), AkzoNobel (healthcare products, coatings, chemicals), Thales (aerospace, space, defence, security), Crucell (biopharmaceuticals), Tata Steel/Corus (steel) and Rijk Zwaan Seeds & Services (vegetable breeding).

Figure 1 The national research and innovation system and its governance



The main actors and institutions in research and innovation system and its governance are the Ministry of Education, Culture and Science ([OCW](#)) and the Ministry of Economic Affairs, Agriculture and Innovation ([EL&I](#)). In broad terms, OCW is responsible for higher education, science and basic research, while EL&I is responsible for application oriented research and innovation. EL&I is the result of a merger in October 2010 of the Ministry of Economic Affairs (EZ) and the Ministry of Agriculture, Nature and Food Quality (LNV). This new 'super'-ministry plays a stronger role in central governance of national innovation policy: policy budgets for the PROs [TNO](#) (Netherlands Organisation for Applied Scientific Research) and the Large Technological Institutes²¹ have been transferred to EL&I and EL&I has a stronger say in the allocation of research funding by the national research council [NWO](#) and Royal Netherlands Academy of Arts and Sciences [KNAW](#).²² The traditional gap between OCW and EL&I is narrowing as a result. One of the mechanisms for policy coordination is the Council for Economy, Labour and Innovation (REWI), which prepares the decisions to be taken by the plenary cabinet. It is one of the sub-councils of the Council of Ministers. REWI is coordinated by the minister of EL&I. Its agenda and the foreseen decisions are coordinated and prepared by the inter-departmental Committee on Economy, Labour and Innovation (CEWI), which consists of high-level civil servants of all ministries involved. The Dutch governance system includes several (advisory) bodies that are involved in policy analysis and evaluation. The main bodies are the Advisory Council for Science and Technology Policy ([AWT](#)), the Royal Netherlands Academy of Arts and Sciences

²¹ The Large Technological Institutes are active in aerospace ([NLR](#)), energy ([ECN](#)), water management and hydraulic engineering ([Deltares](#)) and maritime research ([MARIN](#)).

²² Since the new ministry of EL&I has been made responsible for horizontal innovation policy coordination, the interdepartmental Knowledge & Innovation department that was established by the previous cabinet was discontinued in 2010 by the new cabinet.

([KNAW](#)), the Netherlands Bureau for Economic Policy Analysis ([CPB](#)) and the Scientific Council for Government Policy ([WRR](#)).

The main bodies that are responsible for managing and implementing policies are [NWO](#), the research council for technical sciences [STW](#) (an independent part of NWO), [KNAW](#), and [NL Agency](#) (an agency of EL&I).

Given the relatively small size of the Netherlands, regions do not play a big role in research and innovation governance. In the last decade, however, the provinces have developed more ambitious innovation policies. As a supplement to regular generic economic policy aimed at creating attractive conditions for business location, provinces now often have specific policies that target strong or promising regional clusters – which tend to coincide with the top sectors identified in national policy. Furthermore, all Dutch regions fall under the Regional Competitiveness and Employment objective of the EU Cohesion Policy 2007–2013.²³ A large share (39%) of ERDF funding is used for R&D, innovation and entrepreneurship.

Main research performers in the public knowledge infrastructure are the 14 Dutch research universities (including an Open University), the 19 [research institutes](#) of KNAW, the 9 [research institutes](#) of NWO, the research institutes of the Wageningen University and Research Centre ([WUR](#))²⁴, TNO, the four Large Technological Institutes (NLR, ECN, Deltares and MARIN), various Leading Technology Institutes ([TTIs](#) in Dutch), and several state-owned research and expertise centres.

By far the most important private research performers are the large multinational R&D intensive companies (Philips, ASML, Shell, DSM, NXP, Unilever, Océ, KPN/Getronics, AkzoNobel, Thales, Crucell, Tata Steel/Corus and Rijk Zwaan Seeds & Services), which together amount for more than half of all business expenditures on R&D.

2 Structural challenges faced by the national system

This chapter identifies the structural challenges faced by the national innovation system in The Netherlands. It focuses on the weaknesses and bottlenecks, rather than the strengths. The assessment is based on available economic analysis and a benchmarking of its performance against the EU average and/or countries considered as similar. The [Innovation Union Scoreboard](#) shows that The Netherlands is one of the ‘innovation followers’ with an above average performance.²⁵ Within this group, The Netherlands is a ‘moderate grower’. Other countries in the group are Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Slovenia and the UK.

²³ For the 2007-2013 period, the Netherlands has been allocated €1,907 million in total, €1,660 million under the Regional Competitiveness and Employment objective, and €247 million under the European Territorial Cooperation objective. To complement the EU investment under the National Strategic Reference Programme, the Netherlands’ amounts to at least €2,319 million in current prices. (See ec.europa.eu/regional_policy/atlas2007/fiche/nl_en.pdf).

²⁴ The specialised research institutes are active in agro technology & food sciences, animal sciences, environmental sciences, plant sciences and social sciences.

²⁵ Relative strengths are in the categories of Open, excellent and attractive research systems, Finance and support and Intellectual assets. (IU Scoreboard 2010).

The Dutch national innovation system faces two main structural challenges: the lack of innovativeness of the business sector and the (future) supply of human capital, especially in science & engineering.

(1) Innovativeness of the business sector

For many years, the R&D intensity and innovativeness of the private sector has been recognised as a weakness of the Dutch innovation system. There are several indicators that show a below EU average performance.

Business R&D expenditures (BERD) are relatively low (0.88% of GDP in 2009) and further declining. A large part of the low BERD can, however, be attributed to the Dutch sector structure, with a relatively large service sector and a low share of high-tech industry within the industry sector.²⁶ A large part of R&D by Dutch businesses is performed by a limited number of large multinationals.²⁷ Together they amount for more than half of all business expenditures on R&D. The low BERD is reflected in the relatively low share of researchers in the Dutch labour force.²⁸

Non-R&D innovation expenditures are relatively low, but these show a strong growth.²⁹ Other indicators that show a lack of innovativeness are below EU average scores on SMEs introducing product or process innovations, SMEs introducing marketing or organisational innovations and Sales of new-to-market and new-to-firm innovations.³⁰ In particular the number of technological innovative companies remains a weakness of the Dutch innovation system.³¹ While the Dutch economy is very dependent upon exports, The Netherlands performs below EU average in terms of Medium and high-tech manufacturing exports and Knowledge-intensive services exports.

While the Dutch research system is highly productive (in terms of publications and patents) and publications have a high impact (citation score), the valorisation or commercialisation of research results by start-ups³² or incumbent firms has been a structural challenge for many years. In particular collaboration between SMEs and knowledge institutes is relatively low.

Entrepreneurship in the Netherlands is, however, becoming stronger especially in terms of higher entrepreneurial intentions, a higher early-stage entrepreneurial activity and a higher rate of informal investment. Remaining weaknesses include the rates of product

²⁶ The sector structure effect is 0.3% of GDP (in 2007) according to a recent study for the ministry of EL&I (EIM (2011) Analyse sectorstructuur en private R&D, Zoetermeer).

²⁷ Philips (electronics), ASML (integrated circuits equipment), Shell (oil & gas), DSM (nutritional and pharma ingredients, performance materials and industrial chemicals), NXP (semiconductors), Unilever (food, personal care), Océ (copiers), KPN/Getronics (ICT services), AkzoNobel (healthcare products, coatings, chemicals), Thales (aerospace, space, defence, security), Crucell (biopharmaceuticals), Rijk Zwaan (seeds), Tata Steel/Corus (steel) (Dialogic & NIFU STEP (2011) Wetenschaps-, Technologie & Innovatie Indicatoren 2011).

²⁸ IU Competitiveness Report 2011

²⁹ IU Scoreboard 2010.

³⁰ IU Scoreboard 2010.

³¹ CBS (2010) Het Nederlandse ondernemingsklimaat in cijfers 2010, Den Haag/Heerlen

³² The percentage of innovative start-up companies that uses new/young technologies remains well below the target of 30% in the Knowledge Investment Agenda – this indicator (and other entrepreneurship related indicators) do, however, show an upward trend. (EIM: Global Entrepreneurship Monitor: Netherlands).

innovation and business innovation among early-stage entrepreneurs the number of fast-growing enterprises.³³

(2) Weaknesses in the human capital

Another relative weakness is in human capital and higher education. Too many students in higher education drop out too early, talented students are not sufficiently stimulated and challenged in their education, and the system is too inflexible to respond adequately to the varied demands from students and the labour market.³⁴ The quality of higher education is good in general, but there is too little room for excellence. More differentiation is needed in the structure of the system, in the profiles of the higher education institutes and in the courses that are offered.

Furthermore, life-long learning is not well developed in the Netherlands. The number of students older than 30 years grows only slowly (10% since 1990). The number of part-time students is not high and further declining. The share of employees that receive further training is also low.³⁵

While the participation in higher education is increasing since 2000, the number of the number of graduates in science & engineering is well below EU average. A consequence of the low number of graduates in science & engineering is that the Dutch Universities of Technology have to rely on a large share of PhD students and researchers from abroad, which creates risks for robustness of the Dutch innovation system.

While the Netherlands has a relatively large (and increasing) share of HRST in the labour force,³⁶ the share of R&D personnel in the labour force is relatively low³⁷ and gradually decreasing. Also the share of researchers in the labour force is relatively low and further decreasing.³⁸ The number of researchers in 2009 decreased in particular in the business enterprise sector (-18%) and in the public research institutes (-13%). In the HEI sector, on the other hand, there was a small increase (+4%) in the number of researchers.³⁹

3 Assessment of the national innovation strategy

3.1 National research and innovation priorities

This section briefly describes the national priorities of the research and innovation (R&I) strategy as they are presented in the main policy documents. The current centre-right wing cabinet (a minority coalition of the pro-business liberal party-VVD and the conservative Christian Democratic Appeal-CDA) came into office on 14 October 2010.

³³ EIM (2011) Global Entrepreneurship Monitor 2010 The Netherlands. The emergence of an entrepreneurial society.

³⁴ [Advies van de Commissie Toekomstbestendig Hoger Onderwijs Stelsel](#) (2010) Differentieren in drevoud.

³⁵ [Advies van de Commissie Toekomstbestendig Hoger Onderwijs Stelsel](#) (2010) Differentieren in drevoud. OECD (2011) Education at a glance. KIA (2011) [Kennis en Innovatie Foto 2011](#), Januari 2011, Amsterdam.

³⁶ NL=51.9%; EU27=40.5% in 2010 (Eurostat).

³⁷ NL=0.99%; EU27=1.07% in 2009 (Eurostat).

³⁸ NL=0.5%; EU27=0.7% in 2009 (Eurostat).

³⁹ Kennis en Innovatie Foto 2011: Eerste voortgangsrapportage over de Kennis en Innovatie Agenda 2011-2020, KIA-Bestuur, Januari 2011.

Its R&I strategy is incorporated in EL&I's 'To the top: Towards a new enterprise policy' (February 2011),⁴⁰ followed by 'To the top: Enterprise policy in action(s)' (September 2011);⁴¹ and OCW's 'Quality in diversity: Strategic Agenda Higher Education, Research and Science' (July 2011).⁴²

In EL&I's R&I strategy, entrepreneurship is considered as crucial for wealth creation in the Netherlands. It is argued that societal and economic challenges demand for a policy that gives 'room for entrepreneurs'. Indeed, entrepreneurs – rather than the government – seize economic opportunities and create economic growth, jobs and wealth. The government should not steer with rules and subsidies. Instead, it should ensure that companies have sufficient room to do business, to invest, to innovate and to export. Key elements in the new enterprise/innovation policy are: (i) less subsidies in exchange for lower (corporate) taxes and tax incentives; (ii) less and simpler rules; (iii) broader access to corporate finance (credit facilities); (iv) better utilisation of the public knowledge infrastructure by businesses – especially in the 'top sectors'; and (v) better alignment of fiscal policy, education policy, foreign policy and diplomacy with the needs of businesses – especially in the 'top sectors'.

The formal longer-term policy ambition is: (1) The Netherlands in the top 5 of knowledge economies in the world (in 2020); (2) Increase of Dutch R&D-expenditures to 2.5% of GDP (in 2020); (3) Creation of Top consortia for Knowledge and Innovation (TKIs) in which public and private parties participate for more than €500m, of which at least 40% is funded by the business sector (in 2015).

The basic rationale for the new enterprise/innovation policy is that globalisation and societal challenges (e.g. ageing, food security, scarcity of raw materials, reduction of biodiversity and climate change) not only create threats but also (economic) opportunities that can be seized by companies. This requires an excellent public knowledge infrastructure that is better aligned with the needs of the business sector and a business sector which invests more in R&D and innovation. Furthermore, strong regional clusters are important because they contribute to the attractiveness of the Netherlands as a location for (foreign) knowledge-intensive companies. Therefore, the national and regional governments should collaborate more intensively. In the national R&I strategy, regional governments are invited to align their policy agenda (and budgets) with the priorities in national policy. Also the European level is considered as important, not only in terms of the internal market and a level playing field, but also in terms of aligning 'top sectors' in the Dutch economy with EU programmes for R&I (Horizon 2020).

The national R&I strategy identifies nine 'top sectors': Agro-food; Horticulture and propagating stock; High-tech materials and systems; Energy; Logistics; Creative industry; Life sciences; Chemicals; and Water. The top sectors build on the unique strengths of the Dutch economy. They are characterised by strong market and export

⁴⁰ In Dutch: "Naar de top: de hoofdlijnen van het nieuwe bedrijfslevenbeleid" (<http://www.rijksoverheid.nl/documenten-en-publicaties/kamerstukken/2011/02/04/naar-de-top-de-hoofdlijnen-van-het-nieuwe-bedrijfslevenbeleid.html>).

⁴¹ In Dutch: "Naar de Top; het bedrijvenbeleid in actie(s)" (<http://www.rijksoverheid.nl/documenten-en-publicaties/rapporten/2011/09/13/naar-de-top-het-bedrijvenbeleid-in-actie-s.html>).

⁴² In Dutch: Kwaliteit in verscheidenheid. Strategische Agenda Hoger Onderwijs, Onderzoek en Wetenschap (<http://www.rijksoverheid.nl/documenten-en-publicaties/rapporten/2011/07/01/kwaliteit-in-verscheidenheid.html>).

positions, a good knowledge base, public-private collaborations and a potential to contribute to innovative solutions for societal challenges.⁴³

In an interactive policy process, the government, the business sector and knowledge institutes in the top sectors will jointly identify the problems and opportunities for each sector. In the sectoral approach all relevant policy domains (e.g. education policy, research policy, foreign policy, environment policy ...) are combined in integral policy agendas. For each top sector a 'top team' of entrepreneurs and researchers has been formed. These have been asked by the cabinet to make concrete proposals for these policy agendas. Concrete measures in the new enterprise/innovation policy – in part inspired by the suggestions of the 'top teams' are listed in the table below.

Table 2 Recent policy measures and actions

Policy line	Policy measures and actions
Better valorisation of knowledge	<p>A new fiscal incentive for investments in R&D (RDA) per 1 January 2012. The budget for this measure is €250m in 2012 and will increase to €500m in 2015.</p> <p>Reallocation of existing R&D (policy) budgets towards top sectors. In 2015, NWO, KNAW and the PROs will allocate at least €600m of their budgets to the top sectors – based on 'innovation contracts' that will be closed between businesses, knowledge institutes and the government (in March 2012).⁴⁴</p> <p>Initiatives for public-private collaboration will be bundled as much as possible in 'Top consortia for Knowledge and Innovation' (TKIs). To stimulate private sector contributions to these TKIs a new fiscal incentive (RDA+) will be introduced in 2013. RDA+ is part of a broader fiscal 'innovation package' of €100m/year. Half of this package is used for RDA+; the other half will be used for promotion of cross-sector mobility of knowledge workers (knowledge workers scheme) and for an optional enlargement of the fiscal incentive WBSO.</p> <p>In addition, 2.5% of the procurement budget of the government will be used for innovation-oriented procurement (including SBIR) with projects in the top sectors.</p>
Better access to corporate finance for SMEs and innovative entrepreneurs	<p>A new SME+ Innovation Fund (in 2012) will provide loans to SMEs. In addition, the temporary Business loan guarantee scheme (for loans of max. €50m) will be extended and the budget for guarantees of the SME loan guarantee scheme (BMKB) will be increased from ca. €750m to €1b.</p>

⁴³ The 'top sectors' largely overlap with the 'key areas' from the previous cabinet period. In the period 2007-2010 subsidies for innovation programmes in key areas were a major instrument in the innovation policy mix.

⁴⁴ The contributions of NWO and KNAW to the top sectors will increase from €90m in 2012, €175m in 2013, €260m in 2014 to €350m in 2015. The contributions of the PROs (TNO, Large Technological Institutes and DLO institutes) in the period 2012–2015 are €200m, €215m, €230m and €250m, respectively. These represent significant shares of their budgets. For instance, in 2010 NWO invested (together with its partners in the public and private sectors) in total circa €740m in new research at universities and national research institutes. KNAW has an annual budget of circa €150m, mostly for the KNAW research institutes. TNO, the largest PRO in the Netherlands, has an annual turnover of circa €560m.

Policy line	Policy measures and actions
Less and simpler rules	<p>Abolishment of the mandatory annual contributions to Chambers of Commerce and other reductions in rules and regulations.</p> <p>Companies get the opportunity to suggest alternatives for existing regulations and laws ('right to challenge'; starting with 10-15 experiments).</p>
Talent (human capital) for the business sector	<p>Stimulate public-private collaboration in education in the top sectors.⁴⁵</p> <p>Taking demands from the business sector into account in both admission and development of study programmes.⁴⁶</p> <p>The top sectors have been asked to draw up plans – supported by the Platform Science and Technology – to address the shortage of scientists, engineers and technicians and to get more students in science and technology.</p> <p>Top sectors have been asked to make proposals for private scholarships. A study is done to investigate in what ways the government can give (financial) incentives to stimulate the choice for study careers in science and engineering.</p> <p>In 2011 a pilot is started to simplify the admission of knowledge migrants with a short stay. The fiscal facility for expats will be better oriented and adapted to ensure that this facility can also be used by foreign PhD graduates that want to stay and work in the Netherlands.</p>
International positioning and branding of the Netherlands	<p>Proposals on how to use international opportunities inside and beyond Europe will be developed by the top teams.</p> <p>Foreign policy will be oriented towards strengthening the position and profile of the Netherlands, e.g. via trade missions. A strategic agenda for trade missions will be coordinated with regional/local governments.</p> <p>In attracting foreign investments the emphasis will be on attracting high-value, strategic investments in top sectors. The ambition is at least 150 investment projects with a total worth of €625m (3,000 jobs) by 2012.</p> <p>Economic diplomacy and the attraction of foreign investments will be strengthened by involving internationally prominent (former) CEOs, politicians, scientists and administrators.⁴⁷</p> <p>Initiatives from the top sectors that aim to strengthen the economy and society in developing countries, will be supported by programmes for Development Aid. The contribution from these programmes will increase from €200m in 2012 to €300m in 2015, of which €55m for public-private partnerships (€25m for food security / private sector and €30m for water).</p>

⁴⁵ Via 'Centres for Innovative Skills' (Intermediate Vocational Training, with a budget of €16.4m) and 'Centres of Expertise' (Higher Vocational Education, with a similar budget)

⁴⁶ OCW provides the budget (growing to €310m in 2015) for a quality impulse in the higher education sector.

⁴⁷ CEOs of Dutch-based foreign companies will be invited to act as 'ambassador' for CEOs of foreign companies that think about opening a location in the Netherlands.

Policy line	Policy measures and actions
Stronger regional clusters	Since the top sectors are manifest in regional clusters, regional governments are expected to play an important role in the top sector approach and contribute with additional funding. ⁴⁸ In 2012 agreements will be made between national and regional governments on subjects such as attracting foreign companies/investments/talents, trade missions, innovation contracts and human capital.

The main differences with previous policy can be summarised as follows:

- Shift in the budgetary balance in the innovation policy mix from specific to generic policy. Specific subsidies for innovation programmes are discontinued and more emphasis is placed on generic fiscal facilities for stimulating R&D and a generic (revolving) Innovation Fund. €500m worth of business subsidies are abolished and replaced by tax incentives and loans.
- The governance within the national government is stronger centralised within the ministry of EL&I. This includes the transfer of a part of the R&D budgets from other ministries to EL&I (i.e. funding for PROs) and EL&I getting a say in the allocation of research funding via NWO and KNAW.
- Knowledge institutes are expected to play a prominent role in the top sectors. They will have to participate in the top sectors with a substantial part of their budgets, leaving less room for other priorities that do not fit within the top sectors. This is in line with OCW's Strategic Agenda for Higher Education, Research and Science (see below), which has the aim that knowledge institutes create more distinguishing profiles (specialisations) in education and research.
- The role of the government vis-à-vis businesses is different: the government no longer gives (programme-based) subsidies to companies, but rather invites companies to co-fund publicly funded research that meets their needs. The government determines the conditions and oversees the total portfolio.
- In the top sector approach businesses have a stronger lead in setting the policy agenda – more than in the 'old' key area approach. They have a dominant role in the 'top teams' that develop the agendas for each top sector.
- The top sector approach integrates all relevant policy domains in integrated agendas. Policy issues include reduction of administrative burdens, access to corporate financing, fiscal policy, foreign affairs and education policy.
- The FES fund, which is fed with revenues from natural gas exploitation, is no longer used for investments in R&I. In the previous cabinet periods, the FES fund was a major source of programme-based investment impulses and led to a total investment in the knowledge and innovation domain of almost €3b in four multi-annual investment rounds in the period 2005–2010.⁴⁹

The abolishment of innovation subsidies is one of the major shifts in policy. It is not only due to the need to cut budgets in time of economic crisis but also to fact that the current cabinet does not see subsidies (grants) as an effective policy instrument to stimulate

⁴⁸ Financial contributions of the provinces: Gelderland (€100m), Limburg (€55m), Overijssel (€250m) and Zuid-Holland (€40m). The policy agendas of South-East Netherlands (Brainport 2020) and the North-wing of the Randstad are also aligned with the top sector approach.

⁴⁹ In 2010, €658m was invested in knowledge and innovation via the FES fund. In 2015, this will be reduced to €245m. After 2015, no money will be available from the FES fund.

businesses.⁵⁰ The cabinet's philosophy is that entrepreneurs do not so much need complex subsidies in order to innovate, but rather excellent framework conditions and a good 'innovation climate'. Generic tax incentives and loans can be delivered more efficiently than specific (programme-based) subsidies. The main innovation policy implementation organisation, Agency NL, has been reduced in size substantially as a consequence of the new policy (-40% in jobs).

EL&I's top sector approach and OCW's Strategic Agenda for Higher Education, Research and Science ('[Quality in diversity](#)') have the same starting point: entrepreneurs, researchers, lecturers and students should be stimulated to excel. They should be given sufficient room (i.e. less rules, less subsidies) to make their own decisions and to invest, and to dare to specialise. The cabinet wants to create the right conditions for entrepreneurship and science to perform at their best, increasingly in a joint effort, based on an excellent higher education system.

OCW's Strategic Agenda presents a long-term perspective for the higher education system in 2025. After an analysis of the current situation, it is concluded that a change of course is necessary. Four main lines of action are identified:

1. a more stringent and ambitious study climate;
2. HEIs should develop stronger distinguishing profiles in education vis-à-vis other HEIs which should lead to more differentiation and specialisation in education;
3. stronger (public-private) collaboration in the triangle education-research-entrepreneurship;
4. HEIs should develop stronger distinguishing profiles in research vis-à-vis other HEIs, which should lead to more differentiation and specialisation in research.

A new element is that performance agreements will be made between OCW and HEIs to make them accountable for the achievements in these four areas.⁵¹ The performance agreements should result in a reduction of the number of study programmes, study programmes that are more relevant for the labour market, more focus and critical mass in research and more impacts of research.

Other concrete policy measures include: a reallocation of budgets for a 'quality impulse' in higher education; changes in the allocation system for HE funding, with a large component for 'quality and profile'; and new laws and regulations to effectuate new policy measures for ensuring/guaranteeing the quality of diplomas, study success, teaching quality and intensity, selection of students, differentiation in supply of study programmes and funding of HEIs. To support the top sector approach, the valorisation task of HEIs is better anchored (in the mission).

The "[Policy Mix Project](#)" identified the following six 'routes' to stimulate R&D investment:⁵²

⁵⁰ It is argued that innovation policy in the past decade has not succeeded in raising the levels of R&D investments by the Dutch business sector nor in improving the valorisation or commercialisation of research in public knowledge institutes.

⁵¹ On 9 December 2011 an agreement on the main lines was made between OCW and the universities' association VSNU. This agreement describes the road towards performance agreements between OCW and the individual universities, and the issues that are relevant for these agreements. (See [website](#) VSNU)

⁵² The routes cover the major ways of increasing public and private R&D expenditures in a country. Each route is associated with a different target group, though there are overlaps across routes. The routes are not mutually exclusive as, for example, competitiveness poles of cluster strategies aim to

1. Promoting the establishment of new indigenous R&D performing firms;
2. Stimulating greater R&D investment in R&D performing firms;
3. Stimulating firms that do not perform R&D yet to perform R&D;
4. Attracting R&D-performing firms from abroad;
5. Increasing extramural R&D carried out in cooperation with the public sector or other firms;
6. Increasing R&D in the public sector.

Route 1 is not one of the dominant routes in the Dutch policy mix in terms of budgetary weight. There are several (smaller) programmes, however.⁵³ Route 2 was and is a very important route in the Dutch policy mix. It includes several of the largest policy measures, including the fiscal incentives [WBSO](#) and the new [RDA](#).⁵⁴ Obviously, these tax incentives have some relevance for routes 1 and 3 as well. Route 3 is mainly taken indirectly via measures that subsume under route 2 and that are easy accessible.⁵⁵ Route 4 becomes increasingly important, but it is mainly addressed via other routes (especially 2, 5 and 6). In general, the Dutch government aims to create an attractive climate for R&D intensive firms from abroad in terms of an attractive fiscal climate, an ambitious learning culture and an excellent research climate.⁵⁶ In the new top sector approach, foreign policy will be used to create a stronger 'brand' of the Netherlands as an attractive location for talented knowledge workers, R&D investments and R&D-performing businesses. Route 5 no longer benefits from programme-based subsidies and investments from the FES fund. Both have been abolished. In the top sector approach, companies are invited to participate in TKIs and a fiscal scheme (RDA+) will be introduced to give a tax incentive to companies to participate in the TKIs. Route 6 will remain important in terms of size of public research funding. In the top sector approach, a substantial share of the R&D funding via NWO, KNAW and the PROs will, however, become part of the innovation contracts of the top sectors (cf. route 5). The national R&I priorities are consistent with structural challenges in the Dutch R&I system (see previous Chapter). Much of the policy measures are aimed at increasing the R&D-intensity of the Dutch business sector, especially via the top sector approach. The

act on several routes at a time. Within one 'route', the policy portfolio varies from country to country and region to region depending on policy traditions, specific needs of the system etc.

⁵³ The programme [Seed capital technostarters](#) reduces risk for VC funds. In 2012 the programme will be taken up in the new [SME+ Innovation Fund](#). A complementary programme is being developed for the later-stage VC market. In addition, the [Venture Capital measure](#) gives tax incentives to individuals to lend money to starting entrepreneurs. The [Valorisation Grant](#) programme stimulates researchers to start their own business.

⁵⁴ The WBSO was and will remain the main generic policy instrument to stimulate companies to invest (more) in R&D. The complementary RDA scheme will be introduced in 2012. It gives companies a higher tax deduction for R&D investments and R&D exploitation costs. Other (smaller) schemes in this route are the new [SME+ Innovation Fund](#), the [Innovation Performance Contracts subsidy scheme \(IPC\)](#) (IPC) scheme, [Eurostars projects subsidy scheme](#) (Eureka), the [Small Business Innovation Research programme](#) (SBIR).

⁵⁵ For instance, the WBSO is also available for firms that start to perform R&D for the first time. [Syntens Innovation Centre](#) is an important measure for this route. The Innovation Vouchers scheme was discontinued in 2011.

⁵⁶ Initiatives in this route include the [Netherlands Foreign Investment Agency](#) (NFIA) and a network of Offices for Science and Technology ([TWA network](#)) in various countries.

challenges in human capital are also addressed in EL&I's top sector approach and in OCW's Strategic Agenda.

3.2 Trends in R&D funding

The GERD has increased slightly in 2008-2010 as % of GDP – mainly thanks to a sharp drop in GDP growth –, but remains well below EU average. In terms of euro per capita the GERD has decreased in 2009, but increased in 2010. The GBAORD is well above EU average and has increased during 2008-2010, both in terms of million euros and as % of GDP.⁵⁷ The BERD is relatively low with 0.87% of GDP (2010). In real terms, there was a decline in R&D expenditure by the private sector, which can largely be attributed to the financial/economic crisis. The business sector is responsible for only 47% of GERD (2010), which is much lower than EU average (62%). The HE sector takes a relatively large – and increasing – share with 41% of GERD (EU27: 24%). A relatively large part of GERD is financed by abroad.

Table 3: Basic indicators for R&D investments in Netherlands

	2008	2009	2010	EU average 2010
GDP growth rate* (%)	1.8	-3.5	1.7	2,0
GERD (% of GDP)	1.77	1.82	1.83	2.0
GERD per capita (€)	640.2	631.3	649.7	490.2
GBAORD (€ million)	4,145,8	5,070,1	5,332,7	92,729.05
GBAORD (% of GDP)	0.70	0.89	0.91	0.76
BERD (€ million)	5,263	4,900	5,095	151,125.56
BERD (% of GDP)	0.89	0.86	0.87	1.23
GERD financed by abroad (% of total GERD)	10.7**	10.9	n.a.	N/A ⁵⁸
R&D performed by HEIs (% of GERD)	37.9	40.2	40.8	24.2
R&D performed by PROs (% of GERD)	12.0	12.8	11.9	13.2
R&D performed by Business Enterprise sector (% of GERD)	50.1	47.1	47.3	61.5

Source: Eurostat. *) GDP at market prices; Percentage change on previous period. **) 2007

The national investment target is GERD=2.5% of GDP in 2020. Because of the sector structure in the Dutch economy – with a large service sector and a small high-tech sector within a relatively small industry sector – a 2.5% target is argued to be more realistic and appropriate than a 3% target.

The largest part of the GBAORD (in € mln) is spent by OCW. 79% (2010) of OCW's total R&D budget of €3.1b is allocated via institutional funding, mostly in the form of a block grant to universities (€2.0b).⁵⁹ The remaining 21% is allocated to project-based funding (€635m in 2010), which included subsidies to NWO for specific thematic or talent programmes. EL&I has the second largest R&D budget (€689m in 2010). The balance in

⁵⁷ The sharp increase in 2009 can largely be contributed to the introduction of a new calculation method.

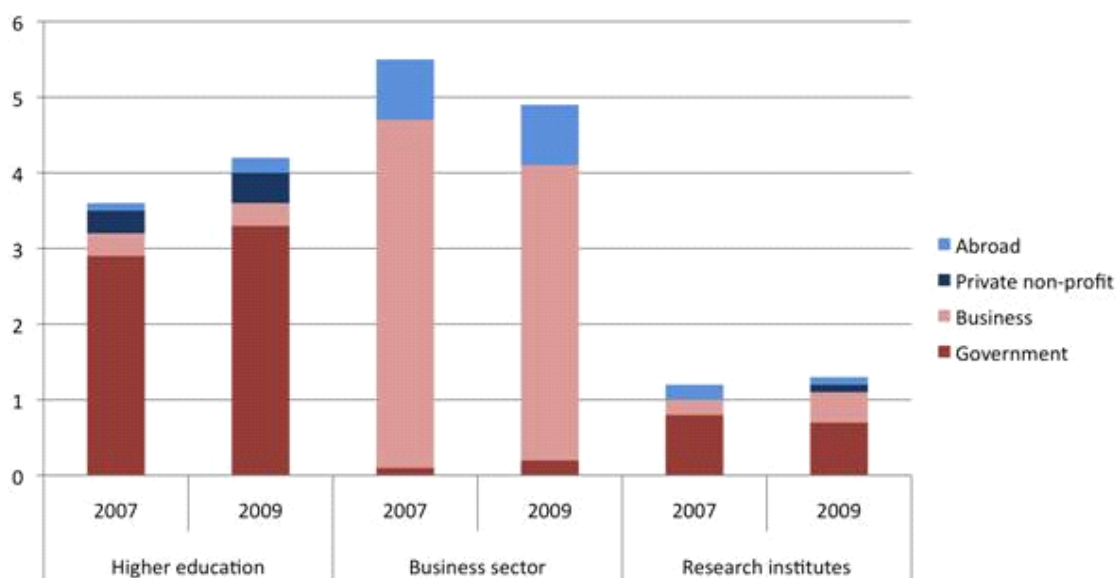
⁵⁸ 8.4 (2009), 9.04 (2005)

⁵⁹ OCW (2010) 'TOF cijfers 2008-2014' gives an overview and analysis of GBAORD for each department

type of funding is opposite to OCW: 27% is for institutional base funding to various research institutes, including a contribution to the research council STW for R&D programmes in the technical sciences. The project-based funding includes a broad range of programmes, most of which stimulate public-private R&D collaboration. In general, the trend in the last 25 years has been towards more project-based funding.⁶⁰ The current cabinet, however, replaced €500m worth of subsidies by generic tax incentives, which will affect the balance between project-based and institutional base funding – especially for EL&I.

Figure 2 shows the R&D funding streams in 2007 and 2009. The R&D expenditures by the HE sector increased from €3.6b to €4.2b, mainly thanks to an increase in R&D funding by the government. The R&D expenditures by the Business sector, on the other hand, decreased mainly because a drop in private R&D funding. The R&D expenditures by PROs increased thanks to a rise in private R&D funding. R&D funding. In 2007–2009 the total R&D funding of the Government increased with 11% (from €3.8b to €4.2b), while the R&D funding from the Business sector dropped with 10% from €5.1b to 4.6b. R&D funding from abroad remained €1.1b.

Figure 2: R&D funding streams in 2007 and 2009 (in € mln R&D expenditures)



Source: Own calculations based on OCW's "Kerncijfers 2005-2009" and "Kerncijfers 2006-2010".

The share of generic innovation policy vis-à-vis specific innovation policy has increased in the period 2008-2011. This is mainly caused the increase in generic tax incentives. The balance will further shifts towards generic policy.

Public-private collaboration in R&I has gained importance in the last decade and will continue to be important to leverage public R&D funding. In the top sector approach 'innovation performance contracts' and 'Top consortia for Knowledge and Innovation' play central roles. A higher contribution from the private sector is expected (40%), and the government will stimulate such private contributions via a fiscal incentive (RDA+).

3.3 Evolution and analysis of the policy mixes

With the introduction of the new enterprise policy in 2010, the policy mix is changing. As described above, there are several changes:

⁶⁰ Rathenau Instituut (2007) Dertig jaar publieke onderzoeksfinanciering in Nederland 1975 – 2005: Historische trends, actuele discussies, Den Haag.

- The 'key area approach' (via the 'programmatic package') is replaced by the 'top sector approach'. While the key areas and the top sectors largely overlap, the policy approaches are quite different. The subsidies for (large, multifaceted) innovation programmes for each of the key areas are abolished – for instance, the FES fund will no longer be used for investment impulses in such programmes. Instead, 'action agendas' are currently being developed for each of the nine top sectors (by 'top teams' with members from the business sector and knowledge institutes). In these agendas opportunities and bottlenecks for the top sectors are addressed and concrete (policy) actions are suggested. Topics include research and innovation, foreign policy, (sectoral) framework conditions, education and training and sustainability. These suggestions are taken up by the cabinet and translated into concrete policy measures. 'Innovation contracts' will be an important element in the sectoral agendas. These contracts state the agreements made (on content and financial contributions) between businesses, knowledge institutes and the government (ministries, research council, etc.). The government has a total budget of circa €1.5b available for the top sectors – mainly existing R&I budgets that are reallocated. The 'top teams' can make proposals for allocating these resources. The top teams do not have their 'own' budgets, but can influence the way in which available budget is spend. NWO, KNAW and the PROs use their existing budgets to participate in the innovation contracts (in 2015 at least €600m of their R&D budgets will be tied to these contracts). The business sector is expected to fund 40% of the R&I that is performed under the innovation contracts – which is considerably more than what they used to contribute to public-private collaborations in R&I. A fiscal incentive (RDA+) will be introduced to stimulate businesses to make such financial contributions.
- The generic 'basic package' in the 'old' innovation policy mix is evolving as well. While some existing measures are continued (e.g. [Innovation Performance Contracts subsidy scheme \(IPC\)](#), [Syntens](#) and [Eurostars projects subsidy scheme](#)), new or renewed generic measures are introduced as well. New measures are aimed at improving access to corporate financing. The new [SME+ Innovation Fund](#) combines two 'old' measures: the [innovation credit scheme](#) and the [Seed capital facility](#) for 'technostarters'. The scheme has a larger budget – which is in line with the shift in balance from subsidies towards fiscal incentives, loans and guarantees. A new element is that it also addresses later-stage venture capital (via a fund-of-fund approach). Finally, it is a revolving fund, which means that revenues from successful innovations will benefit the SME+ Innovation Fund.
- Generic fiscal incentives play a large role in the policy mix. First, a new [Research & Development Allowance \(RDA\)](#) scheme is introduced in 2012. The aim of RDA is to make investments in innovation more attractive (from a fiscal perspective). The RDA offers a higher tax relief for R&D investments in capital equipment and exploitation costs. The RDA is introduced in 2012 and the budget will increase to €500m in 2015, making it one of the largest measures in the innovation policy mix. It is complementary to the 'old' [R&D tax credit \(WBSO\)](#) which offers a tax relief on R&D wage costs. The budget is €864m in 2012. In addition, the '[innovation box](#)' (until January 2010 called 'patent box') offers a corporate tax relief for all revenues from innovation – a reduced tariff of

5%. The total budget for fiscal measures increases (with 30%) in the period 2011–2015 from €1.5b to €1.9b.

3.4 Assessment of the policy mix

The two main structural challenges – as identified in Chapter 2 – are well-recognised in policy. As discussed above, the current cabinet decided to change track in innovation policy and to abolish most subsidy/grant schemes and replace them with generic tax incentives and loans and with a top sector approach which put businesses in the lead. In the table below, an assessment is given of the new policy mix. Although much of the policy changes can be considered appropriate in times of economic crisis and budgetary restrictions, there are risks as well. It remains to be seen to what extent the top sector approach combined with generic tax incentives and loans will succeed in creating an economic structure in the Netherlands that is more R&D intensive and more innovative. There is a risk that radical innovation and renewal is not sufficiently encouraged and that the status quo is reinforced.

The actions in OCW's Strategic Agenda for Higher Education, Research and Science appear to be appropriate as well. Policy aims to improve the quality and diversity in higher education, which is in line with the main structural challenge in human capital. It is positive that the coordination between EL&I's and OCW's strategies appears to be more intensive than it has been in the past. EL&I's emphasis on top sectors and OCW's emphasis on specialisation/differentiation of HEIs coincide. A general risk is that the 'shock to the system' may be too large or too sudden to be absorbed effectively by the R&I system, especially when the changes are not accompanied by additional policy budgets. The coming years will show the responsiveness of the Dutch R&I system to the new policy mix.

Table 4 Structural challenges, policy measures/actions and assessment

Challenges	Policy measures/actions ⁶¹	Assessment in terms of appropriateness, efficiency and effectiveness
Innovativeness of the business sector	<p>Less innovation subsidies</p> <p>More tax incentives</p> <p>More loans</p> <p>Less and simpler rules for businesses</p> <p>More involvement of business with the public knowledge infrastructure</p> <p>Aligning education and training with business needs</p> <p>International positioning and branding of (the top sectors of) the Netherlands</p>	<p>In times of severe budget restrictions due to the financial and economic crisis it is appropriate to try to reallocate existing budgets in a more effective and efficient way. The replacement of specific subsidies by generic tax incentives is part of this effort. It may be a risk, however, that tax reliefs are more usable and beneficial for larger companies, rather than (young, innovative) SMEs – thus reinforcing the status quo and the reliance of the Netherlands of the large multinational R&D intensive companies. Tax incentives seem not very appropriate to change the economic structure of the Netherlands towards a more R&I intensive structure.</p> <p>It is also appropriate to put the business sector in the lead in developing action agendas for the top sectors, expecting them to contribute 40% in public-private R&I collaborations. It remains to be seen, however, what the ‘innovation contracts’ will contain and if the 40%-target will be met. It is also a risk that the emphasis will be too much on shorter-term application oriented R&D and that longer-term strategic basic research will be under pressure.</p>
Supply of human capital: more graduates, higher quality and better aligned with business needs	<p>Promoting a climate that stimulates students to perform and excel; more emphasis on quality rather than quantity in student numbers</p> <p>Development of distinguishing profiles and specialisation of HEIs, rewarding quality and sharp profiles in the allocation of funding of HEIs.</p> <p>More specialisation and differentiation and less fragmentation in supply of study programmes, taking into account needs of the labour market</p>	<p>It is appropriate that the supply of study programmes will be aligned with business needs. Idem. for the stronger role of entrepreneurship in education and researcher training.</p> <p>It is appropriate that the HE system provides more incentives for students (and lecturers) to perform better.</p> <p>It is appropriate that HEIs are induced to create more distinguishing education and research profiles. It will help to align the universities with the business sector in the top sectors. There is a risk, however, when there is insufficient coordination at the system level, that gaps will emerge in the broad base of scientific education and research.</p>

⁶¹ Changes in the legislation and other initiatives not necessarily related with funding are also included.

4 National policy and the European perspective

The national policy mix has been changed significantly recently. It is too early to know how effective and efficient the new policy mix will be. In general, the new developments seem appropriate in view of the structural challenges.

The Annex gives an overview of the alignment of national policies with ERA pillars / objectives. In the table below, the main challenges for each of the ERA objectives is summarised. The table also lists the main recent policy changes for each of the ERA objectives. Based on the assessment of the national policies in view of the ERA objectives, a possible direction towards which the current policy mix could evolve in short and medium term is more explicit attention for opportunities offered by cross-border collaboration. In the strategy documents, the international dimension predominantly appears in terms of the need to be internationally competitive and attractive rather than in terms of opportunities for joint activities (e.g. to solve societal challenges).

Table 5: Assessment of the national policies/measures supporting the strategic ERA objectives (derived from ERA 2020 Vision)

	ERA dimension	Main challenges at national level	Recent policy changes
1	Labour Market for Researchers	<p>Increase the share of R&D personnel and researchers in the labour force.</p> <p>Create better career perspectives for young researchers, also from abroad.</p> <p>Reduce the over-reliance on foreign PhD candidates in the natural and technical sciences and engineering.</p> <p>Attract more students in natural and technical sciences and engineering.</p> <p>Improve entrepreneurship amongst students and (young) researchers.</p> <p>Get more women in senior academic positions</p>	<p>More variation in training of researchers (PhD candidates). Universities will be allowed to introduce bursary PhD students, in addition to PhD candidates that are employed by the university.</p> <p>Action plans in the top sector approach to increase the number of students in science & engineering (at all levels)</p> <p>More attention for entrepreneurship in education (e.g. via the Valorisation programme) and alignment of education and training with business needs (in top sectors)</p>
2	Cross-border cooperation	<p>Opportunities for cross-border cooperation could be further explored and exploited.</p>	<p>No main recent changes.</p>
3	World class research infrastructures	<p>Address problem of the lack of structural budget for large-scale research infrastructures</p>	<p>Investment in large-scale research facilities as part of reallocation of budgets to stimulate universities to create more distinguishing profiles.</p> <p>Updating of the national roadmap for large-scale research facilities.</p>
4	Research institutions	<p>Create more distinguishing profiles in education and research for universities</p>	<p>Changes in the allocation system for HE funding with more attention for 'quality' (rather than quantity) and creation of a distinguishing profile.</p> <p>Introduction of performance agreements between universities and the government</p>

	ERA dimension	Main challenges at national level	Recent policy changes
5	Public-private partnerships	<p>Realise effective PPPs while subsidies for public-private collaboration in R&D are largely phased-out.</p> <p>Further improve valorisation capabilities and competences of universities.</p>	<p>Discontinuation of subsidies (e.g. from the FES fund) for PPPs in R&D.</p> <p>Introduction of top sector approach, which put firms in the lead of developing public-private 'innovation contracts' where they are expected to contribute 40% of the budget.</p> <p>Anchoring valorisation as a formal third mission of HEIs.</p>
6	Knowledge circulation across Europe	<p>More emphasis on cross-border circulation and cooperation, in addition to the current focus on national knowledge circulation and R&D cooperation. Policy is structured according to national top sectors rather than European challenges.</p>	<p>The top sectors are expected to take the lead in developing cross-border collaborations – if this helps to improve the competitiveness of the top sector</p>
7	International Cooperation	<p>Develop a new/updated national strategy for international cooperation.</p>	<p>No main recent policy changes. The latest internationalisation agenda is from 2008.</p>

Annex: Alignment of national policies with ERA pillars / objectives

1. Ensure an adequate supply of human resources for research and an open, attractive and competitive single European labour market for male and female researchers

1.1 Supply of human resources for research

The Netherlands has a relatively large (and increasing) share of HRST in the labour force (NL=51.9%; EU27=40.5% in 2010).⁶² The share of R&D personnel in the labour force is, however, relatively low (NL=0.99%; EU27=1.07% in 2009) and gradually decreasing. The share of researchers in the labour force is also relatively low and further decreasing (NL=0.5%; EU27=0.7% in 2009). The number of researchers in 2009 decreased particularly in the business enterprise sector (-18%) and in the public research institutes (-13%). In the HEI sector, on the other hand, there was a small increase (+4%) in the number of researchers.⁶³ In general, the Dutch labour market for (academic) researchers suffers from a lack of career perspective within universities.⁶⁴ Outside the universities there is little demand for doctorates, which is related to the Dutch sector structure (with a relatively small share of R&D intensive sectors) and the relatively low societal status of a PhD degree in the Netherlands. In practice, there is no real labour market for doctoral graduates in the Netherlands. The training for PhD candidates tends to be too specialised or narrow for the business enterprise sector and insufficiently aligned with the labour market outside the university sector. Although the training of PhD candidates is in general of good quality, there is room for improvement in mentoring and a broadening of the training to prepare PhD candidates for a career outside the university. At the same time, unemployment of doctoral graduates is not a major problem: 90% has a job. Most of them work in the business enterprise sector; 20% works as a researcher. Of these 20%, ca. one quarter works in the higher education sector.⁶⁵

Data on mobility and levels of inward versus outward flow of researchers are not available for the Netherlands. However, in a recent study a large sample of PhD candidates were surveyed.⁶⁶ Contrary to what is often feared, there is no evidence for a 'brain drain' – indeed, there appears to be a relative 'brain gain'.⁶⁷ A large majority (75%) of PhD candidates hopes to remain in the Netherlands and only 11% wants to move to another country. 37% of the international PhD candidates who have come to the Netherlands specifically to pursue their PhD, will remain in the Netherlands after completing their PhD (20% are undecided and 43% want to leave the Netherlands). The study also showed that two-thirds of the PhD recipients were born in the Netherlands. PhD recipients born in other countries are most likely to come from elsewhere in Western Europe, Asia or Eastern Europe. Less than 5% of the PhD recipients come from North America, Latin and South America or Africa. The most important reason for international PhD candidates to come to the Netherlands is the scientific reputation of the institute or supervisor (51%), followed by the scientific or professional infrastructure in the field (20%), a job or economic opportunities (12%) and educational opportunities (9%). International PhD candidates are more heavily represented in the Natural Sciences (32%), Engineering (44%) and Agricultural Sciences (48%), which correlates that the relatively high shortages of Dutch candidates in these fields. The Netherlands attracts a relatively large share of

⁶² Eurostat

⁶³ Kennis en Innovatie Foto 2011: Eerste voortgangsrapportage over de Kennis en Innovatie Agenda 2011-2020, KIA-Bestuur, Januari 2011.

⁶⁴ Most university research is performed by PhD candidates rather than postdocs. The lack of postdoc positions contributes to worsening career perspectives. And postdocs often find it difficult to get a permanent position at a university. Most of them are forced to find an occupation outside the universities – after having had several temporary postdoc positions. (OCW (2005) Making the most of talented researchers).

⁶⁵ CBS, 2007, Careers of Doctorate Holders 200

⁶⁶ Sonneveld, H., M. Yerkes, M. and Schoot, R. v.d. (2010) Ph.D. Trajectories and Labour Market Mobility. A survey of recent doctoral recipients at four universities in the Netherlands. Utrecht: Netherlands Centre for Graduate and Research Schools.

⁶⁷ 'Brain drain' is defined as PhD completed in the Netherlands but leaving after the PhD for another country. 'Brain gain' occurs when an individual comes to the Netherlands to complete the PhD and then stays.

international scientists from countries outside the EU (e.g. China). They are mainly active in science and engineering.

There are several measures in the Netherlands that stimulate outward mobility of researchers.⁶⁸ In general, young researchers in the Netherlands are stimulated to gain experience abroad, as this is considered beneficial for their scientific careers. Dutch researchers actively participate in European programmes such as [Marie Curie actions](#) and [ERC grants](#). With regard to inward mobility, the [Innovational Research Incentives scheme](#) (a large scheme for talented researchers in various stages of their careers) had been made accessible for foreign researchers that want to come to the Netherlands. In 2009 a new Admission Scheme for Highly Educated Migrants was introduced.⁶⁹ In June 2011, the EU blue card was introduced in the Netherlands. While Dutch immigration law already has several resident purposes which comply with this EU directive, this introduction will have some advantages for immigrants from third countries.⁷⁰

1.2 Ensure that researchers across the EU benefit from open recruitment, adequate training, attractive career prospects and working conditions and barriers to cross-border mobility are removed

Academic staff in the Netherlands does not have the status of civil servant – they are employed by universities which have a large degree of autonomy in HRM and financial matters. Non-nationals are eligible in competition for permanent research and academic positions. There is no national legislation that regulates (access to) permanent research positions and that helps or hinders the openness towards non-nationals. According to the 2007 EC report [Remuneration of Researchers in the Public and Private sectors](#) the total yearly salary average of researchers in the Netherlands is relatively high.⁷¹ The Netherlands not only has relatively high remuneration of researchers, but also a high relative increase in salaries as the career progresses. The comparison of researchers' remuneration per scientific domain against the situation of similar professions in the Netherlands shows that, in most scientific domains, the total yearly salary costs of researchers are higher than the total yearly salary costs of similar professions.

Academic positions tend not to be exclusively reserved for internal staff or people from the domestic labour market. To be internationally competitive, knowledge institutions are motivated to attract the best international researchers, including those from other world regions. Recruitment for academic positions can be done either in a closed procedure (without public announcement) or a open procedure (with a public announcement). In practice, a closed procedure (for full professorship) is a bit more frequently used.⁷² This limits the candidates to the networks of those involved. A selection committee has a large influence on the eventual selection of the candidate. In comparison with, for instance, the USA the Dutch recruitment practice is less thorough and broad. There are, however, an increasing number of Dutch universities and research institutes that adopt more elaborate and competitive procedure, especially in fields where both research and recruitment are internationally oriented.

To address the lack of career perspectives of young researchers, several Dutch universities have introduced tenure track systems to improve career perspectives. However, these are often small scale initiatives that are limited to science and engineering faculties. In addition, some academic research institutes have introduced a flat structure with principal investigators that lead their own research groups. Notwithstanding these new

⁶⁸ E.g. NWO [Rubicon](#)-mobility grants, NWO exchange programmes with China, Japan, South Korea and Taiwan, NWO [Visitors Travel Grant](#) for foreign senior researchers and grants of universities.

⁶⁹ This scheme allows highly-educated foreign nationals who have attained at least a Master's degree to obtain a residence permit with a maximum term of 1 year in the Netherlands in order to find a job as a highly-skilled migrant or to start an innovative company. This scheme can ensure that foreign exceptional talents (who currently do not yet come to the Netherlands, but who can create economical added value for the Netherlands) are more easily admitted to the Netherlands. See <http://www.ind.nl/> for more information.

⁷⁰ After 18 months of legal residency with the EU blue card the migrant can freely move to another member state for a highly skilled position. To obtain a permanent residence status in one of the member states (under certain conditions) the migrant can add up the periods of residency in any other member state. The migrant will have equal rights as a EU citizen. The migrant will have better conditions for family reunification and its family members will have better access to the labour market.

⁷¹ The remuneration average was €59,103 in 2006, while EU25 average was €37,948. The report concludes that the Netherlands is one of the few countries that have an average remuneration similar to that of the United States, considering the cost of living in each country.

⁷² De Jonge Academie (2010) Rendement van talent: Aanbevelingen voor motiverend en stimulerend loopbaanbeleid. (www.dejongeacademie.nl).

developments, most of the universities still have a traditional structure with a hierarchical and pyramidal structure. At the top there are professors, associate professors (UHD in Dutch) and assistant professors (UD in Dutch). These categories of academic personnel have permanent positions. More than half of the academic personnel consist of temporary positions, often younger researchers, i.e. PhD candidates, PostDocs. The share of temporary personnel had increased while the number of permanent positions has decreased. At the same time, the length of temporary positions is short while the average duration of permanent positions is long. This makes the through-flow even more problematic. It also contributes to the underrepresentation of women in senior positions.

While the limited availability of permanent positions makes the Netherlands less attractive for foreign talented researchers, the quality of national Research Infrastructures, on the other hand, is quite good. Indeed, to attract talented researchers, Dutch universities promote themselves, inter alia, high success rates in European fund and grant applications, state-of-the-art research facilities and attractive employment conditions (also for PhD candidates). The salaries of researchers in the Netherlands are relatively high in comparison with EU27.⁷³ According to the [Collective Labour Agreement of the Dutch universities](#), some flexibility is allowed compared with general salary rules and levels. If in the opinion of the employer the employee performs his/her duties very well or extremely well, his/her salary may be increased to a higher amount listed in the salary grade.⁷⁴

Implementation of the [European Charter for Researchers](#) and the Code of Conduct for the Recruitment of Researchers is the responsibility of the knowledge institutes.⁷⁵ The Association of the Dutch Universities [VSNU](#) is signatory to the Charter.⁷⁶ In addition, the Charter is also signed by the Maastricht Graduate School of Governance of the Maastricht University and Tilburg University.

With regard to the [European Higher Education Area](#), the Netherlands introduced a Bachelor-Master structure and the European Credit Transfer and Accumulation System. Accreditation and quality assurance are important aspects in international mobility of students and staff. The Netherlands (and Flanders) has contributed in developing the Dublin Descriptors (operationalising Bachelor's, Master's and Doctoral awards).

There is a clear system in place for the evaluation of academic credentials (diplomas) of foreign candidates. On request, the [Information Centre for Credential Evaluation](#) issues a written statement which indicates how foreign diplomas and study programmes are valued in the Netherlands.⁷⁷

Research vacancies supported by public funds tend to be internationally advertised, especially on the European researcher's mobility portal Euraxess. [Euraxess The Netherlands](#) is an information and advice point for internationally mobile researchers wishing to come to or staying in the Netherlands. The website offers information on funding opportunities, job offers, immigration procedures, social security and tax issues and other topics relating to researcher mobility.

With regard to the portability of research grants, NWO has signed [EUROHORCs' Money Follows Researcher](#) initiative. Researchers that have been awarded a personal subsidy from NWO can make a request to continue their research abroad.

1.3 Improve young people's scientific education and increase interest in research careers

⁷³ According to the 2007 EC report [Remuneration of Researchers in the Public and Private sectors](#) the total yearly salary average of researchers in the Netherlands is relatively high.⁷³ The Netherlands not only has relatively high remuneration of researchers, but also a high relative increase in salaries as the career progresses. The comparison of researchers' remuneration per scientific domain against the situation of similar professions in the Netherlands shows that, in most scientific domains, the total yearly salary costs of researchers are higher than the total yearly salary costs of similar professions.

⁷⁴ A rise in salary is, however, only possible if he/she has not yet reached the maximum salary in his/her salary grade.

⁷⁵ The Dutch government sees the Charter as voluntary and non-legally binding nature. (Government response to the green paper: the European Research Area: new perspectives. And 22112, no. 460, 22-8-2006).

⁷⁶ The VSNU has initiated drawing up its own Code of Conduct with regard to the recruitment of international researchers, based on the Charter and Code of Conduct, the European Guideline for the admission of researchers from third countries and the Code of Conduct for International Students in Dutch higher education. (OCW, *Voortgangsrapportage Wetenschapsbeleid* [Science Policy Progress Report] 2007, 29338, no. 55)

⁷⁷ The Information Centre for Credential Evaluation (IcDW) acts as a central desk where applications for credential evaluation can be submitted.

Policies and incentives in place to ensure a sufficient supply of science, technology, engineering and mathematics (post)graduates and an appropriate mix of skills among the population in the medium-to-longer term?

In 2004, the Dutch government established the [Platform Science and Technology](#) to ensure a sufficient supply of science, technology, engineering and mathematics (post)graduates. The aim was to achieve a structural increase of 15% more pupils and students in these fields of education and to use existing talent more effectively in businesses and research institutes.⁷⁸ Careers in science, technology, engineering and mathematics should be made more appealing and educational innovations should be introduced that inspire and challenge young people. The Platform therefore targets schools, universities, businesses, ministries, municipalities, regions and sectors. In 2010, the 15%-target was achieved. Subsequently, the Platform developed a joint [S&T Agenda 2011-2016](#) with parties from education and business to ensure a continued effort.

Since 2000, the ministries of EL&I and OCW have stimulated entrepreneurship in education in collaboration with organisations from the education and business sectors, e.g. via the [action programme Education and Entrepreneurship](#).⁷⁹ EL&I and OCW have each made available €15m for the period 2008–2011 to stimulate knowledge exchange between education institutes and entrepreneurs. The action programme stimulates entrepreneurship and an entrepreneurial attitude in education, from elementary school to universities. The [Valorisation programme](#) promotes HEIs setting up Centres of Entrepreneurship (facilities for entrepreneurship education and knowledge-intensive start-ups).

1.4 Promote equal treatment for women and men in research

In the [Collective Labour Agreement \(CAO\) for universities](#) several agreements have been made to reduce the negative effects of career breaks on women's research careers.⁸⁰ The employer is forbidden to terminate a permanent employment contract and prematurely terminate a fixed-term employment contract during pregnancy or during the period in which the employee is on maternity leave and during a period of six weeks after resuming work or a period of incapacity for work as a result of the birth or the preceding pregnancy following maternity leave.

Several measures have been introduced to address the serious underrepresentation of women in senior scientific and management positions. OCW has asked universities to make diversity an integral part of their regular personnel and career policies.⁸¹ In response, universities have committed themselves and introduced plans and measures to improve the representation of women in higher scientific and management functions. Successful measures include mentoring projects for women, premiums for female PhD candidates or postdocs, tenure track programmes for women only, and a network for female academics within universities with an advisory role towards University Boards.⁸²

OCW has made available extra funding within the [Innovation Research Incentive scheme](#) to give grants to excellent women that were not awarded in the first instance (because lack of funds, not because insufficient quality). OCW also gives financial support to the renewed [Aspasia](#) programme⁸³ and to the Dutch Network of Women Professors ([LNVH](#)). In 2009, LNVH published an overview of measures that are applied by

⁷⁸ See the [Delta plan Science & Technology](#), 2005.

⁷⁹ The objectives: (i) An increasing number of educational institutions have integrated entrepreneurship in their policy, their organisation and their curriculum; (ii) A growing number of pupils and students show more entrepreneurial behaviour and start up their own business within a period of five years after completing their education. More information: the brochure [Education takes Action!](#) and the progress report [Entrepreneurship and Education](#).

⁸⁰ The maximum term of a temporary employment contract (6 years) can be extended with the amount of maternity or parental leave taken if the employee requests this. A female employee who enjoys pre and post maternity leave by virtue of the Work and Care Act is entitled to full remuneration during this leave. The total term of the pre and post maternity leave is at least 16 weeks. In addition, an employee who has a parental relationship with a child is entitled to parental leave on partial pay.

⁸¹ In the CAO it is agreed that within the recruitment and selection policy, the employer (university) shall pursue an incentive policy aimed at women, the occupationally disabled, foreigners and other employee groups in a disadvantaged or otherwise vulnerable position.

⁸² [Vrouwen in de wetenschap - de feiten](#).

⁸³ Aspasia aims to increase the number of women senior lecturers. In Aspasia new-style the procedure is as follows: Women wanting to qualify for promotion to senior lecturer or professor via an NWO programme can submit a proposal in the [Innovation Research Incentive scheme](#). The laureates will be recommended by NWO to the University Boards for promotion; the universities make the decision.

universities to boost the number of women in academic positions.⁸⁴ In 2009 the majority of universities and university medical centres signed the [Talent to the Top Charter](#) and agreed to formulate quantitative goals and policies in the following three to five years for the recruitment and promotion of women and to compile an annual report on the extent to which the formulated goals are achieved. Also NWO and its institutes signed the Charter.⁸⁵ NWO also has a number of [policy initiatives](#) and special programmes (e.g. [MEERVOUD](#) and [FOM/v](#)) to improve the position of women in science.⁸⁶ Although women are still underrepresented in senior academic positions, the trend is upwards. In the period 2000-2010, share of women in academic positions increased from 6% to 13% for professors, from 10% to 20% for senior university lecturers, and from 23% to 33% for university lecturers.⁸⁷

2. Facilitate cross-border cooperation, enhance merit-based competition and increase European coordination and integration of research funding⁸⁸

The Netherlands participates in almost all [Joint Programming](#) initiatives.⁸⁹ Dutch parties (e.g. NWO and Agency NL) play an active role in the [ERA-NET scheme](#)⁹⁰ and in three of the four articles 185 TFEU Initiatives in FP7.⁹¹ The Netherlands also participates actively in ESF's Exploratory Workshops, Networks and à la carte Programmes. Dutch parties are also actively involved in about 40 [European Technology Platforms](#) (ETP) and five [Joint Technology Initiatives](#).⁹²

An increasing number of NWO subsidies and NWO research programmes aiming at talented scientists are [open for applications](#) by researchers affiliated with universities and institutes from abroad. The demands for admission may vary for each subsidy. Usually, researchers must perform the research in the Netherlands. NWO wants to facilitate the attraction and retention of scientific talent from abroad. All NWO grants will remain accessible for researchers from throughout the world, on the condition that the research is carried out in the Netherlands.

National innovation programmes usually do not allow subsidies for foreign parties (to prevent that Dutch taxpayers' money is spent on firms abroad).⁹³ In specific case, an exception can be made, for instance in situations where companies that are based in the Netherlands collaborate with companies that are located elsewhere, and it is considered desirable to support these firms abroad as well. The results of such cross-border collaboration should be beneficial for the Dutch economy or society. For example, foreign parties (HEIs, PROs, companies) can be a partner in the [Leading Technology Institutes](#) – public-private partnerships in strategic research in the form of virtual research institutes.

⁸⁴ LNVH (2009) [Emancipatiebeleid voor Universiteiten](#): Een overzicht van in Nederland toegepaste maatregelen.

⁸⁵ The target for 2015 40% women in all external boards and committees; 25% in senior positions; 36%

⁸⁶ Age limits will be abolished (as much as possible). An extension clause is introduced (based on pregnancy, parenthood, part-time work in combination with care). A systematic data gathering of men/women scores in applications and awards is set up. Committees and boards will be composed in accordance with the man/woman distributions in academic populations. Women committee or board members are actively sought. The NWO Governing Board has established target figures for the male/female distribution in committees and boards.

⁸⁷ Dialogic & NIFU STEP (2011) Wetenschaps-, Technologie & Innovatie Indicatoren 2011

⁸⁸ Promote more critical mass and more strategic, focussed, efficient and effective European research via improved cooperation and coordination between public research funding authorities across Europe, including joint programming, jointly funded activities and common foresight.

- Ensure the development of research systems and programmes across the Union in a more simple and coherent manner.
- Promote increased European-wide competition and access of cross-border projects to national projects funding

⁸⁹ (1) Neurodegenerative Diseases/Alzheimer's; (2) Agriculture, food security and climate change; (3) A healthy diet for a healthy life; (4) Cultural heritage & global change; (5) Urban Europe; (6) CliK'EU; (7) More years, better lives; (8) Water challenges and (9) Healthy & productive seas and oceans.

⁹⁰ In Life Sciences the Netherlands participates in 12 ERA-NETs, in Environment & Energy in 18 ERA-NETs, in Humanities & Social Sciences in 8 ERA-NETs, in Fundamental Research in 9 ERA-NETs and in Industrial Technologies in 21 ERA-NETs.

⁹¹ Ambient Assisted Living (AAL); EUROSTARS and European Metrology Research Programme (EMRP).

⁹² Embedded systems (ARTEMIS), nano-electronics (ENIAC), innovative medicines (IMI), aeronautics (Clean Sky) and Fuel Cells and Hydrogen (FCH)

⁹³ Kaderbesluit EZ-subsidies, Staatsblad 2008, nr. 499.

3. Develop world-class research infrastructures (including e-infrastructures) and ensure access to them

The Netherlands is co-founder and member of several large inter-governmental research organisations because membership creates synergies and critical mass. It also gives researchers access to advanced research facilities, which could not be financed by one single country because of the size. The concentration of researchers within these research organisations gives significant scientific added value. The Netherlands participates in CERN, EMBL, EMBC, ITER, ESO and ESA.⁹⁴

Via NWO, the Netherlands participates in several large research facilities, including the Dutch-Flemish synchrotron radiation research facility (DUBBLE) within ESRF (Grenoble), the James Clerk Maxwell Telescope (Chile) and the Isaac Newton Group of Telescopes (La Palma). When appropriate, the research institutes of NWO and KNAW are encouraged to function as national 'portals' to international research programmes.

The Committee National Roadmap Large-Scale Research Facilities published in 2008 a report to the minister of OCW with recommendations on research facilities that should be built in the Netherlands and facilities that should be shared internationally. [The Netherlands' Roadmap for Large-Scale Research Facilities](#) included 35 projects that are on the European (ESFRI) Roadmap and have a Dutch component. In the process towards the roadmap, an inventory was made which identified 66 publicly funded large-scale facilities in the Netherlands.⁹⁵ The Netherlands has a relatively strong position in ICT infrastructure (including e-science facilities), physics and materials science, (bio)medical research, astronomy and facilities for storing and accessing research data. The total gross value of the research facilities is estimated at €3.5b (excluding the intrinsic value of collections). By far the largest part of the large-scale facilities has at least a national character, and almost half has (at least partly) an international orientation.

In 2009 NWO organised a call of €63m for the first eight projects of the Dutch Roadmap (via bundling of resources for Large Infrastructure of the period 2008–2011). Five projects have been awarded in astrophysics, astronomy, biomedical research, languages, and social sciences.⁹⁶ In 2009, an investment of €184m was made (from the FES fund) in large-scale infrastructure.⁹⁷ Six projects were awarded, one with direct linkages to an ESFRI project (BBMRI). It is unclear what levels of funds can be expected to be committed by the Netherlands for the second phase of the implementation of the ESFRI infrastructures. The new cabinet announced that it will no longer use FES funds for investments in knowledge and innovation. The Committee National Roadmap had recommended the minister of OCW to establish a structural budget for investments in large-scale facilities. This advice was, however, not followed. Instead, a new 'Committee Taskforce Stimulating Large Scale Research Facilities' was established in 2010 with the task to stimulate the implementation of the Dutch Roadmap and to advise the minister on alternative funding options for these facilities. In an advisory report, the taskforce has stressed the importance of periodically updating the roadmap. In 2011, OCW asked NWO to organise the process of updating the roadmap. NWO organised a [review](#) of the roadmap in order to update the National Roadmap for Large-Scale Research Facilities; and to produce prioritisation and funding decisions for the allocation of NWO's Roadmap funds for large-scale research facilities. NWO funds for large-scale research facilities are intended to be invested in the establishment or upgrading of Dutch research facilities of international importance; and in Dutch participation in the construction or substantial modification of international research facilities (and therefore not exclusively the procurement of use rights, although the acquisition of use rights may, of course, be a consequence of such participation).

⁹⁴ OCW (2008) [Grenzeloos Goed](#): Internationaliseringsagenda Hoger Onderwijs-, Onderzoeks- en Wetenschapsbeleid.

⁹⁵ The inventory showed that large-scale research facilities in the Netherlands have become more diverse in the last three decades, that no clear overview of facilities existed, leading to lack of visibility, and that the long-term nature of the facilities is at odds with the way there are funded (project-based). (Horlings, E. and A. Versleijen (2008) Groot in 2008 - Momentopname van Grootschalige Onderzoeksfaciliteiten in de Nederlandse Wetenschap. Den Haag, Rathenau Instituut).

⁹⁶ The proposals are: KM3NeT (astrophysics; €8.8m), BBMRI (biomedical research; €22.5m), ESSurvey (social sciences; €4m), E-ELT (astronomy; €8.8m plus €10m in a later phase), and CLARIN (languages; €9m).

⁹⁷ The facilities are: Lifelines (€40m) (linked to ESFRI project BBMRI), Surfnets 7 (€32m), NCB: Biodiversiteit (€30m), NanoLab (€27.7m), Delta Faciliteit (€25.3m), Second generation lab solar cells (€15.1m), Dynamic Two Phase Flow Lab (€14m). (Source: OCW (2010) Wetenschaps- en Technologie-indicatoren 2010).

A recent policy change in the Strategic Agenda of OCW (July 2011) is that there will be structural investments (€40m/year) in large-scale research facilities as part of the reallocation of budgets in order to stimulate universities to create more distinguishing profiles. In addition, the national roadmap for large-scale facilities will be updated (foreseen March 2012).

4. *Strengthen research institutions, including notably universities*

Universities in the Netherlands have a large degree of autonomy, especially in terms of organisational autonomy (setting university structures and statutes, making contracts, electing decision-making bodies and persons), financial autonomy (acquiring and allocating funding, deciding on tuition fees, accumulating surplus) and staffing autonomy (responsibility for recruitment, salaries and promotions). In terms of academic autonomy (deciding on degree supply, curriculum and methods of teaching, deciding on areas, scope, aims and methods of research) they have less autonomy.⁹⁸

The new Strategic Agenda for Higher Education, Research and Science focuses on the quality of education, the positioning and specialisation of HEIs and collaboration in the triangle research-education-entrepreneurship. Core policy measures include:

- The development of a new system for allocation of HEI funding in which a growing part⁹⁹ of the funding is allocated to 'quality' and 'creation of a distinguishing profile'.
- Individual and collective performance agreements will be made with HEIs on quality improvement, creation of a distinguishing profile and 'valorisation' of knowledge. This should result in a reduction of the number of courses (reduction of fragmentation), education supply that is better aligned with labour market demands, more focus and critical mass in research, and higher (economic and societal) impact of research.

The government uses a combination of bottom-up and top-down elements to improve the quality and the distinctive profiles of HEIs. The HEIs themselves have the lead in making strategic decisions in their institute plans, taking into account the policy goals in OCW's strategic agenda. With the sector organisations (VSNU and HBO-raad) an agreement will be made in which the HEI-sector itself take up the responsibility to achieve the policy objectives. An independent review committee will monitor the progress of HEIs in creating distinctive profiles.

In the Netherlands there are two main types of regular higher education: research universities and universities of applied sciences (UAS). The 47 UAS specialise in technical and vocational training, while the 14 research universities focus on providing scientific instruction and conducting scientific research. The research universities include six general research universities, three universities of technology, four specialised research universities and the Open University. In addition, there are a few private universities, including a business school and a handful of theological universities with a small student and research volume. Non-university private higher education also exists, offering sub-degree level education and BA-level education often on a part-time basis (or at a distance). Private higher education is predominantly catering to the lifelong learning market.¹⁰⁰ In addition, there are eight University Medical Centres that perform research. All research universities have a three-fold mission: teaching, research and utilisation of knowledge (valorisation). The third mission has received more explicit attention since the early 2000s by all universities. Within the research mission, universities have started to create more pronounced research profiles by prioritising specific research areas.

The level of differentiation between the research universities is low. There is hardly any reputational and quality differentiation between the universities. Dutch universities have a good reputation, but none of them belong to the international elite or rank at the top of international ranking lists.¹⁰¹

⁹⁸ European University Association (2011) [University Autonomy in Europe II – The Scorecard](#). This report compares university autonomy across 26 European countries. In addition to an analysis of the current state of institutional autonomy in Europe, the study includes four scorecards which rank and rate higher education systems in four autonomy areas: organisational, financial, staffing and academic autonomy.

⁹⁹ 7% in the current cabinet period 2011-2014

¹⁰⁰ [Progress in higher education reform across Europe: Governance and Funding Reform](#). Report for the EC DG Education & Training by CHEPS et al.

¹⁰¹ Several policy instruments have been implemented which could have induced quality and reputational differences, like the systematic evaluation of research, funding of top graduate schools and the Innovational Research Incentive scheme, but this

The Dutch research system has a tradition of evaluation of research organisations and research itself. Research organisations (e.g. NWO and STW) are periodically reviewed (circa once in six years). For the evaluation of research programmes and institutes there is joint '[SEP protocol](#)' of the association of universities (VSNU), the research council NWO and royal academy KNAW. The research evaluations have the aim to improve the quality of research in a broad sense and to give account of the research that has been performed. The reviews are done once per six years by an external committee. A self-evaluation is made beforehand. A site visit is part of the process. Between two evaluations, a midterm evaluation is done. The evaluation uses a five-point scale for the evaluation criteria quality, productivity, societal relevance and vitality and feasibility. The organisations themselves decide on the unit of evaluation. The reports are public. The evaluations may be done by an independent organisation [Quality Assurance Netherlands Universities](#) (QANU).

Each research university receives a formula-based lump sum (block grant) for teaching and research. The lump sum allocation is based on measures of volume (student numbers, diplomas), prices (rates per student) and historical considerations. The block grant is part of the so-called first stream of funding, which also includes the tuition fees paid by students. The formula-based allocation model distributes a given sum of money (set by Parliament) across the 13 research universities. The formula takes into account the relative performance of each university (as compared to the other universities). The allocation consists of a *teaching* component and a *research* component, but this distinction is for calculation purposes only. In fact, Executive Boards of universities are free to use their own models in distributing the first stream funding across teaching and research activities. The teaching component is 42% of the lump sum (excluding the Academic Hospital allocation), and the research component is 58%. In the current cabinet period (2011-2014) the allocation model will become more performance based. To start with, 7% of the budget (block grant) will be allocated based on performance agreements with HEIs on quality and study success (bonus/malus) and a part for promoting the creation of distinguishing profiles.

5. Facilitate partnerships and productive interactions between research institutions and the private sector

In Dutch innovation policy stimulation of public-private interactions and partnerships has been an important element for many years, both in generic (e.g. innovation vouchers) and specific policy (e.g. innovation programmes in key area). In the current cabinet period 2011-2014, most subsidies for measures that stimulate such interactions and partnerships will be discontinued, however. In the new top sector policy, public-private partnerships and interactions will be promoted as part of the sector agendas that are developed for each top sector.¹⁰² In the top sector approach, the business sector and the public research institutes jointly develop sector agendas with plans for action (in the domains of knowledge and research, foreign policy, sectoral framework conditions, education and training, sustainability, etc.).

The private sector is expected to make financial commitments. The cabinet will reallocate existing research budgets towards the top sectors, taking into account the contribution from private parties. Before the end of 2011, 'innovation contracts' will be made for each top sector between businesses, knowledge institutes and the government. NWO, KNAW and the RTOs (e.g. TNO) will participate for at least €600m in 2015. Initiatives for public-private collaboration will be bundled as much as possible in so-called 'Top consortia for Knowledge and Innovation (TKIs). The cabinet will introduce in 2013 a complementary fiscal innovation package of €100m, half of which will be used for a tax deduction to stimulate the contribution of companies to these TKIs (RDA+, with an indicative tax deduction of 25%). The other half will be used in part to promote the mobility of knowledge workers (the knowledge workers scheme which stimulates cross-sector mobility; see below) and in part to a possible enlargement of the fiscal scheme WBSO.

With regard to the inter-sectoral mobility of researchers, the [knowledge workers scheme](#) was introduced as a temporary measure during the economic crisis in 2009. The scheme made it possible for businesses to

has not happened. Instead, some of these instruments have led to a strong networking of university research into inter-organisational graduate schools, virtual institutes, research consortia and the like. These inter-organisational constructions appear to prevent the differentiation of universities instead of induce it. (James Dawson, Jan van Steen, Barend van der Meulen (2009) Science systems compared: A first description of governance innovations in six science systems, The Hague: Rathenau Institute.)

¹⁰² the nine top sectors are: Agri-Food; Horticulture and propagating stock; High-tech materials and systems; Energy; Logistics; Creative industry; Life sciences; Chemicals; and Water.

second knowledge workers to public knowledge institutes (for max. 1.5 years) to perform R&D in prioritised societal themes. The budget for 2009 and 2010 was €180m. Both private and public parties were positive about the measure.¹⁰³ Therefore, in 2011 it was decided that the scheme will become a structural measure via the fiscal innovation package.

In addition, inter-sectoral mobility is stimulated in various other (less direct) ways, e.g. via public-private partnerships in which researchers from the public and private sectors collaborate and via preparing PhD candidates for the labour market in their postgraduate training programmes.

With regard to the issue of free availability of government-owned research results, NWO has introduced a new open access¹⁰⁴ policy. The guiding philosophy is that research results obtained with public funds should be made freely accessible wherever possible.¹⁰⁵ Open and straightforward access to research results facilitates the research having as big an impact as possible and other people throughout the world being able to benefit from the research results. NWO is signatory of the [Berlin Declaration](#) on open access. NWO will increase the scope of its Open Access policy and encourage researchers to make the results of their publicly funded research freely available to everyone. NWO play an active role in national and international efforts to realise a 'publishing model' in which publications are financed by the author and/or funding body and are then freely accessible, so that everyone can benefit from this without having to pay for access. By explicitly including the rule that data that arise from NWO-funded research are the joint property of NWO in the new [NWO Regulation on Granting](#) of 1 May 2011, NWO makes that rule 'generally binding': the rule automatically applies to all funding instruments of NWO. Co-ownership by NWO is not a goal in itself but aims to ensure that data are shared. NWO has various measures to facilitate Open Access.¹⁰⁶

Dutch universities and research institutes have valorisation as a (third) mission and they all have TTOs or 'valorisation centres'. The Strategic Agenda for Higher Education, Research and Science (2011) announces that valorisation will play a more prominent role in knowledge institutes; not only valorisation of knowledge from medical, technical and natural sciences, but also social sciences and humanities. Valorisation should be firmly embedded in knowledge institutes.

In 2008 a joint valorisation agenda '[Knowledge must circulate](#)' was signed by the government, knowledge institutes and employers with concrete actions. As a follow-up to the agenda, EL&I and OCW started end 2010 the [Valorisation programme](#) (budget €80m for 2010-2012) as an impulse for facilitating the embedding of entrepreneurship in education, screening and scouting of knowledge with a potential for valorisation, protection of knowledge, support of spin-off firms and for creation of networks of companies and knowledge institutes. The new programme builds on, and replaced, the Subsidy programme Knowledge Exploitation (SKE) and the Centres of Entrepreneurship (CoE). The current cabinet has the ambition that by 2016 2.5% (or more) of all public research funds is used for transforming knowledge into innovation. The minister will make performance agreements with universities on output targets. The Committee Valorisation that monitors the implementation of the Valorisation Agenda will be asked for advice on what other actions are needed to realise the 2.5% target. In the quality assurance of research, valorisation will be included as an evaluation criterion. Indicators will be introduced to monitor valorisation activities. In the performance agreements, knowledge institutes are requested to develop HRM policies that stimulate and reward

¹⁰³ See the report [How the Dutch economy preserved its knowledge workers](#) (in Dutch).

¹⁰⁴ Open Access: Publications that are the fruit of scientific research can appear in Open Access journals or Open Access books. They are published online and are available to everyone in the world free of charge, irrespective of where a person works. The authors and/or their funding bodies pay for the costs of their Open Access publications. (See [website](#) NWO on Open Access)

¹⁰⁵ "NWO is of the opinion that the worldwide trend of scientific information provision towards Open Access is unstoppable. From a technical perspective it is becoming increasingly easier to disseminate knowledge and link data. This offers us opportunities that we cannot afford to miss. In this way science could make a bigger and faster contribution to solving some of the challenges society faces." ([website](#) NWO)

¹⁰⁶ Measures include: NWO makes various funds available for Open Access publication by NWO grant awardees, for example the [Incentive Fund Open Access – publications](#) and the [Incentive Fund Open Access – conference contribution](#). The NWO Division for the Humanities has a pilot for the setting up of new Open Access journals or the conversion of existing journals into Open Access journals. This pilot was followed by an NWO-wide funding round for Open Access journals. NWO encourages publishers to experiment with the Open Access publication of books via the project [OAPEN-NL](#) (Open Access Publishing in European Networks). At a national level, NWO works with other stakeholders to develop new publishing models for sharing research results. At a European level, NWO participates in [Science Europe](#) (previously EUROHORCs). (see [website](#) NWO).

scientists and researchers for valorisation efforts. Finally, technology transfer policy in the Netherlands needs further professionalisation. A uniform policy for IP is desirable and

TTOs need to be mandated to do business on behalf of their universities.

The private sector may be involved in the Supervisory Board of universities, which consists of five members external to the university. The Executive Board of universities may also have members that originate from the private sector. The private sector is also involved in the governance bodies of PROs. TNO, for instance, has a Supervisory Board of seven members, appointed by the government, that come from various sectors.

6. Enhance knowledge circulation across Europe and beyond

There are no explicit national measures that support cross-border co-operation in areas with EU added value. However, cross-border co-operation in areas with EU added value is visible in the Innovation Programmes of EL&I (which will be replaced in the coming years by new initiatives in top sectors). In principle, the Innovation Programmes are open for participation of foreign partners (with requirements of co-funding and complementarity). The prioritised 'key areas' largely overlap with the 10 thematic priorities, which have been identified as bringing European added value under FP7. The Innovation Programmes must have an international component and also tie in, wherever possible, with international programmes such as FP7 and EUREKA.¹⁰⁷

NWO has developed a new policy a open access (see above).

7. Strengthen international cooperation in science and technology and the role and attractiveness of European research in the world

The Netherlands does not have a national strategy for international cooperation. The most recent policy document is the Internationalisation Agenda Higher Education, Research and Science policy "[Grenzeloos Goed](#)" (2008). The main policy objectives are to increase the mobility of Dutch students, stimulate an international orientation of education institutes, increase 'brain circulation' and improve the location climate for education and research institutes.

The Netherlands is an active participant in many EU programmes for R&D cooperation. The Netherlands is actively involved in COST, EUREKA, FP7, inter-governmental research infrastructures, ERA-NETs, Art.185 initiatives, JTIs and ETPs, joint programming initiatives, etc.

With regard to bi- and multilateral agreements with other ERA countries, the Netherlands has signed Letters of Intent with Flanders (Belgium) and North Rhine-Westphalia (Germany) for cross-border collaboration in research and innovation. One of the three action lines is sharing of large facilities. In the coming years, concrete collaborative projects will be developed.

In 2011, Flanders and the Netherlands agreed to develop scenarios for economic cooperation under the name "The Low Countries". A long-term strategy will be developed for collaboration in economic affairs, urbanisation and innovation.

With regard to research collaboration between national and foreign research organisations there exist several policy measures that reinforce international cooperation:

- NWO has a set of [programmes](#) that stimulate international collaboration.¹⁰⁸
- NWO provides opportunities and incentives for international research talent.¹⁰⁹
- An increasing number of NWO subsidies and research programmes aiming at talented scientists are open for applications by researchers affiliated with universities and institutes from abroad.

¹⁰⁷ The innovation programmes have the ambition to improve access to international knowledge. By creating focus and (critical) mass in a limited number of key areas, the Netherlands aims to internationally distinguish itself and create a distinct (research) profile for itself – for example in FP7. By creating internationally renowned R&D clusters, the innovation programmes should improve the attractiveness of the Netherlands for foreign knowledge workers and foreign investors in R&D.

¹⁰⁸ For instance, programmes for collaboration with Germany ([Von Humboldt Stiftung](#), [DFG](#)), the United State (e.g. [Fulbright Award](#)), China ([NSFC](#), [JSTP](#)), India ([SSCIN](#)), Japan ([JSPS](#)), Taiwan ([NSC](#)), South-Korea ([KOSEF](#)) and Africa ([WOTRO NACCAP](#), [EDCTP](#)).

¹⁰⁹ For example, the [Innovational Research Incentives Scheme](#) stimulates international 'top talents' and the [Rubicon](#) scheme offers doctoral graduates the chance to gain experience at a top research institution outside the Netherlands.

- NWO participates in multilateral collaborations under the auspices of ESF (e.g. EUROCORES) and the European Commission (e.g. ERA-NET, ERA-NET+).
- EL&I stimulates international R&D collaboration in its Innovation Programmes. Indeed, international collaboration is a key success factor for the programmes.
- NL Agency runs the [National Contact Point FP7](#), which is the centre of expertise for the European Framework Programme in the Netherlands.¹¹⁰
- The Netherlands participates in the [Eureka network](#) and has subsidy schemes for International Innovation and [Eurostars](#).

With regard to participation of national teams in projects involving inter-governmental Research Infrastructures, the Netherlands has funded five projects that are on the European ([ESFRI](#)) Roadmap and have a Dutch component. The Netherlands contributes substantially to large international research organisations such as ESA, ESO, CERN, EMBL, and EMBC. Via NWO, the Netherlands participates in several large research facilities.¹¹¹ When appropriate, the research institutes of NWO and KNAW are encouraged to function as national ‘portals’ to international research programmes.

With regard to the individual mobility of researchers, NWO manages the [Rubicon](#) scheme offering doctoral graduates the chance to gain experience at a top research institution outside the Netherlands. Furthermore, an increasing number of subsidies and research programmes aiming at talented scientists are open for applications by researchers affiliated with universities and institutes from abroad.

NWO’s strategy aims to strengthen investments in emerging science nations, building upon the experience already acquired in China and India. NWO also aims to continue to make efforts to strengthen the knowledge base in less-developed countries. It will do this by contributing to the global research area, building up research capacity and by encouraging the translation of knowledge into sustainable development. The rationale is that world-class research must not be hindered by borders. It is therefore vital that the Netherlands can continue to play a prominent role in international scientific research. NWO aims to provide possibilities for international cooperation and to strengthen the role that Dutch research plays in challenges at a global scale.

With regard to international collaboration with third countries (outside Europe), NWO cooperates with the USA (NSF, Fulbright Award), with Russia and various Asian countries such as China, Taiwan and Korea. Possibilities for strengthening cooperation with a number of fast-growing economies, such as India, are being explored. Existing cooperation programmes with China focus on joint scientific thematic research (e.g. on ‘Integrated Water Management in relation with climate change and sea level rise’) and on inviting highly talented Chinese PhD candidates to conduct research at selected Dutch graduate schools. In addition, there is a cooperation agreement between NWO and the National Natural Science Foundation of China (NSFC), which offers Dutch researchers a chance to do joint research.

NWO has a cooperation programme with India that aims to stimulate sustainable research collaboration by funding joint research projects on the topic medical devices that have the explicit goal to reduce the costs of health care either in India or in the Netherlands.

Via the WOTRO Foundation (Netherlands Foundation for the Advancement of Tropical Research) NWO supports research in and about the tropics in the broadest possible scientific context. Capacity building in the countries involved plays a major role in this. NACCAP (Netherlands-African Partnership for Capacity Development and Clinical Interventions against Poverty-related Diseases) is an example of this.

The KNAW sees it as its task to encourage cooperation with rapidly developing countries, in particular China (in coordination with NWO) and Indonesia. The Academy aims to contribute to capacity-building and to improving the knowledge infrastructure in developing countries. It is concentrating on Africa in this respect, and in particular on cooperation with African academies of science.

¹¹⁰ The NCP FP7 is the former EG-Liaison.

¹¹¹ For instance, the Dutch-Flemish synchrotron radiation research facility (DUBBLE) within ESRF (Grenoble), the James Clerk Maxwell Telescope (Chile) and the Isaac Newton Group of Telescopes (La Palma)

Indonesia and the Netherlands have a long history in cooperation in scientific research.

The KNAW works with Indonesia in a scientific research programme: the Scientific Programme Indonesia – Netherlands (SPIN), which capitalises on existing networks between the two countries.¹¹²

With regard to mobility schemes for researchers from third countries, NWO has cooperation agreements with the National Natural Science Foundation of China (NSFC), the Japan Society for the Promotion of Science (JSPS), the Korea Science and Engineering Foundation (KOSEF), the National Science Council of Taiwan (NSC), which offers Dutch researchers a chance to do research in those countries.

NWO also has a Visitors Travel Grant that allows foreign visitors to stay in the Netherlands.

¹¹² The main aim is to promote long-term cooperation between Indonesian and Dutch research groups and to help develop and consolidate multidisciplinary knowledge networks in the Netherlands focusing on Indonesia. SPIN consists of a number of larger integrated research programmes and supporting activities.

References

- Dialogic & NIFU STEP (2011): Wetenschaps- en Technologie-indicatoren.
- EIM (2011) Analyse sectorstructuur en private R&D.
- Erawatch Network (2006): Country Specialisation Report: The Netherlands.
- EUROPEAN COMMISSION (2011): IU Competitiveness Report 2011.
- EUROPEAN COMMISSION (2011): IU Scoreboard 2010.
- CBS (2007): Careers of Doctorate Holders 2005.
- CBS (2010): Het Nederlandse ondernemingsklimaat in cijfers 2010.
- CHEPS et al. (2010): Progress in higher education reform across Europe: Governance and Funding Reform. Report for the EC DG Education & Training.
- Commissie Toekomstbestendig Hoger Onderwijs Stelsel (2010) Differentieren in drievoud (advisory report).
- De Jonge Academie (2010): Rendement van talent: Aanbevelingen voor motiverend en stimulerend loopbaanbeleid.
- EIM (2011): Global Entrepreneurship Monitor 2010 The Netherlands: The emergence of an entrepreneurial society.
- European University Association (2011): University Autonomy in Europe II – The Scorecard.
- KIA (2011): Kennis en Innovatie Foto 2011.
- LNVH (2009): Emancipatiebeleid voor Universiteiten: Een overzicht van in Nederland toegepaste maatregelen.
- Ministry of EL&I (2011): Naar de top: de hoofdlijnen van het nieuwe bedrijfslevenbeleid”
- Ministry of EL&I (2011): Naar de Top; het bedrijvenbeleid in actie(s).
- Ministry of OCW (2005): Making the most of talented researchers.
- Ministry of OCW (2008): Grenzeloos Goed: Internationaliseringsagenda Hoger Onderwijs-, Onderzoeks- en Wetenschapsbeleid.
- Ministry of OCW (2010): TOF cijfers 2008-2014.
- Ministry of OCW (2010): Wetenschaps- en Technologie-indicatoren 2010
- Ministry of OCW (2011): Kwaliteit in verscheidenheid. Strategische Agenda Hoger Onderwijs, Onderzoek en Wetenschap.
- OECD (2011): Education at a glance.
- Rathenau Instituut (2007): Dertig jaar publieke onderzoeksfinanciering in Nederland 1975 – 2005: Historische trends, actuele discussies.
- Rathenau Instituut (2008): Groot in 2008 - Momentopname van Grootschalige Onderzoeksfaciliteiten in de Nederlandse Wetenschap.
- Rathenau Instituut (2009): Science systems compared: A first description of governance innovations in six science systems.
- Sonneveld, H., M. Yerkes, M. and Schoot, R. v.d. (2010) Ph.D. Trajectories and Labour Market Mobility.

List of Abbreviations

AWT	Advisory Council of Science and Technology Policy
BBMRI	Biobanking and Biomolecular Resources Research Infrastructure
BERD	Business Expenditures for Research and Development
CAO	Collective Labour Agreement
CBS	Statistics Netherlands (<i>Centraal Bureau voor de Statistiek</i>)
CERN	European Organisation for Nuclear Research

CoE	Centers of Entrepreneurship
COST	European Cooperation in Science and Technology
DUBBLE	Dutch-Flemish synchrotron radiation research facility
EC	European Commission
EL&I	Ministry of Economic Affairs, Agriculture and Innovation
EMBL	European Molecular Biology Laboratory
ENIAC	European Technology Platform for Nanoelectronics.
ERA	European Research Area
ERA-NET	European Research Area Network
ERC	European Research Council
ERDF	European Regional Development Fund
ERP Fund	European Recovery Programme Fund
ESA	European Space Agency
ESF	European Science Foundation
ESFRI	European Strategy Forum on Research Infrastructures
ESO	European Southern Observatory
EU	European Union
EU15	European Union including 15 Member States
EU27	European Union including 27 Member States
EZ	Ministry of Economic Affairs
FDI	Foreign Direct Investments
FES	Economic Structure Enhancement Fund
FP	European Framework Programme for Research and Technology Development
FP	Framework Programme
FP7	7th Framework Programme
GBAORD	Government Budget Appropriations or Outlays on R&D
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on R&D
GOVERD	Government Intramural Expenditure on R&D
GUF	General University Funds
HBO-raad	Netherlands Association of Universities of Applied Sciences
HE	Higher Education
HEI	Higher education institutions
HERD	Higher Education Expenditure on R&D
HES	Higher education sector
HRST	Human Resources in Science and Technology
ICT	Information and Communication Technology
IP	Intellectual Property
JSPS	Japan Society for the Promotion of Science
KNAW	Royal Netherlands Academy of Arts and Sciences
KOSEF	Korea Science and Engineering Foundation
LNV	Ministry of Agriculture, Nature and Food Quality
LNVH	Dutch Network of Women Professors
LTI	Large Technology Institute
NACCAP	Netherlands-African Partnership for Capacity Development and Clinical Interventions against Poverty-related Diseases
NFIA	Netherlands Foreign Investment Agency
NSC	National Science Council of Taiwan
NSFC	National Natural Science Foundation of China
NWO	Netherlands Organisation for Scientific Research
OCW	Ministry of Education, Culture and Science

OECD	Organisation for Economic Co-operation and Development
PRO	Public Research Organisations
QANU	Quality Assurance Netherlands Universities
R&D	Research and Development
R&I	Research and Innovation
RDA	Research & Development Allowance
RI	Research Infrastructures
RTDI	Research Technological Development and Innovation
S&E	Science and Engineering
S&T	Science and Technology
S&T	Science and technology
SF	Structural Funds
SKE	Subsidy programme Knowledge Exploitation
SME	Small and Medium Sized Enterprise
SPIN	Scientific Programme Indonesia – Netherlands
TKIs	Top consortia for Knowledge and Innovation
TTI	Technologische Topinstituten
TTO	Technology transfer organisation
UAS	University of Applied Sciences
VC	Venture Capital
VSNU	Association of Universities in the Netherlands
WBSO	Research and Development (R&D) tax credit
WUR	Wageningen University and Research Centre

European Commission

EUR 25712 – Joint Research Centre – Institute for Prospective Technological Studies

Title: ERAWATCH COUNTRY REPORTS 2011: The Netherlands

Author(s): Jasper Deuten

Luxembourg: Publications Office of the European Union

2013– 41 pp. – 21.0 x 29.7 cm

EUR – Scientific and Technical Research series –ISSN 1831-9424 (online)

ISBN 978-92-79-28111-2 (pdf)

doi:10.2791/51693

Abstract

The main objective of the ERAWATCH Annual Country Reports is to characterise and assess the performance of national research systems and related policies in a structured manner that is comparable across countries. EW Country Reports 2011 identify the structural challenges faced by national innovation systems. They further analyse and assess the ability of the policy mix in place to consistently and efficiently tackle these challenges. The annex of the reports gives an overview of the latest national policy efforts towards the enhancement of European Research Area and further assess their efficiency to achieve the targets.

These reports were originally produced in November - December 2011, focusing on policy developments over the previous twelve months. The reports were produced by the ERAWATCH Network under contract to JRC-IPTS. The analytical framework and the structure of the reports have been developed by the Institute for Prospective Technological Studies of the Joint Research Centre (JRC-IPTS) and Directorate General for Research and Innovation with contributions from ERAWATCH Network Asbl.

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.



ISBN 978-92-79-28111-2



9 789279 281112